U.S. SOFTWARE PRODUCTS MARKETS, 1985 - 1990

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Many of INPUT's professional staff members have nearly 20 years' experience in their areas of specialization. Most have held senior management positions in operations, marketing, or planning. This expertise enables INPUT to supply practical solutions to complex business problems.

Formed in 1974, INPUT has become a leading international planning services firm. Clients include over 100 of the world's largest and most technically advanced companies.

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U.S. SOFTWARE PRODUCTS MARKETS
1985-1990

U.S. SOFTWARE PRODUCTS MARKETS, 1985-1990

ABSTRACT

This annual survey provides analyses and five-year forecasts of business-related U.S. software products markets for the period 1985-1990.

The forecast data base in this report includes market size and growth rates for both applications software and systems software products for mainframe/mini and micro software.

The five-year forecasts, which include 1984 as the base year, cover 20 different industry-specific and cross-industry markets for applications software products. Also included are market forecasts for three systems software products sectors— applications development tools, data center management, and systems control.

This report identifies the factors behind the demand for these market segments. In addition, the fastest growing and largest markets are highlighted and analyzed, as are key issues, trends, and developments. Business and market strategy recommendations are provided for vendors interested in increasing their market penetration.

This report contains 227 pages, including 102 exhibits.

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U.S. SOFTWARE PRODUCTS, 1985-1990

CONTENTS

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U.S. SOFTWARE PRODUCTS, 1985-1990

EXHIBITS

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I INTRODUCTION

I   INTRODUCTION

- This report is produced as one of a series of reports in INPUT's Software Markets Program, which is part of the Market Analysis and Planning Service (MAPS) for the Information Services industry.

A.   PURPOSE OF THIS REPORT

- This report reviews and analyzes two important modes of the software market: mainframe/mini- and microcomputer-based software products.

- This report is designed to assist vendors in:

    - Identifying new markets and product opportunities.

    - Assessing product and marketing risk exposure.

    - Allocating R&D and operations resources.

    - Obtaining insights into market-related developments that impact profitability.

- Market analysis and forecasts of other information systems modes may be found in the following companion reports:

- I -

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- Professional services are examined in an INPUT volume entitled <u>Professional Services Markets, 1985-1990.</u>

- Processing services and turnkey systems are analyzed in two other volumes entitled <u>U.S. Processing Services Markets, 1985-1990</u> and <u>U.S. Turnkey Systems Markets, 1985-1990.</u>

B. SCOPE AND ORGANIZATION

- This report focuses on U.S. markets and analyzes user expenditures that are noncaptive (i.e., dollars spent on services and products provided by organizations outside of the buyer's own corporate structure). Note that revenue dollars and expenditure dollars are not the same, especially in the micro segment. This is due to the use of distributors and dealers. Vendor micro software revenue in many cases is half the overall end-user dollar spent on software products.

- This report is organized as follows:

    - Chapter II is an Executive Summary provided in presentation format, complete with script.

    - Chapter III forecasts and analyzes software products in terms of opportunities and challenges, issues, and events. Market sizes and growth rates for the 1985-1990 timeframe for over 20 different major industry-specific and cross-industry applications software products market segments are provided together with data for systems software market segments.

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- Chapter IV includes the major issues and trends that are directly impacting the software market and thereby influencing either positively or negatively its growth and structure.

- Chapter V presents major competitive developments taking place in the industry and describes selected vendor actions.

- Appendix A contains a set of definitions relevant to this report.

- Appendix B contains a complete data base of the market sizes and growth rates discussed in this report, as well as a reconciliation of INPUT's 1984 software forecasts vis a vis this year's forecasts.

- Appendix C lists other INPUT reports that are related to the software markets discussed in this report.

- Appendix D includes a ranking and brief description of the 1984 major independent software vendors which was prepared by INPUT and published in September 1985 Software News.

- Exhibit I-1 profiles the classification scheme used by INPUT to structure the software products marketplace.

- Use of the term AAGR in the text of this report is an abbreviation for Average Annual Growth Rate.

- INPUT welcomes comments and suggestions from its clients concerning the content and format of this report.

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EXHIBIT I-1

SOFTWARE MARKET STRUCTURE

Software

- **Systems Software**
  - **Systems Control**
    - Access Control
    - Communications Monitors
    - Micro-Mainframe Links
    - Network Control
    - Operating Systems
    - Security Systems
    - System Library Control
    - Windowing Systems
    - Other
  - **Data Center Management**
    - Capacity Management
    - Computer Operations Scheduling
    - Data Center Management
    - Disk Management
    - Downtime/Repair Monitoring Management
    - Job Accounting
    - Performance Monitors
    - Tape Management
    - Utilities
    - Other
  - **Applications Development**
    - **Program Development and Production Tools**
      - Application Generators
      - Assemblers
      - Automatic Documentation
      - Compilers
      - Debugging Aids
      - Languages (All Generations)
      - Systems Development Control
      - Retrieval Systems
      - Translators
      - Other
    - **Data Base Management Systems**
      - Data Base Management Systems
      - Data Dictionaries
      - Other

- **Applications Software**
  - **Cross-Industry**
    - **Accounting**
      - Accounts Payable
      - Accounts Receivable
      - Fixed Assets
      - General Ledger
      - Purchasing
      - Other
    - **Human Resources**
      - Benefits
      - Payroll
      - Personnel
      - Other
    - **Planning and Analysis**
      - Budgeting
      - Financial Planning
      - Forecasting
      - Integrated Analysis Systems
      - Modeling
      - Spreadsheet Systems
      - Project Management
      - Other
    - **Engineering and Scientific**
      - Chemical/Biological
      - Electrical
      - Mechanical
      - Piping
      - Nuclear
      - Statistics/Operations Research
      - Structural Analysis
      - Other
    - **Education and Training**
      - Authoring Languages
      - Computer-Assisted Instruction
      - Other
    - **Other Cross-Industry**
      - Business Graphics
      - Sales, Marketing and Distribution
      - Word Processing
      - Desktop Managers
      - Other
  - **Industry-Specific**
    - Banking & Finance
    - Discrete Manufacturing
    - Distribution (Retail and Wholesale)
    - Education
    - Federal Government
    - Insurance
    - Medical
    - Process Manufacturing
    - Services
    - State & Local Government
    - Telecommunications
    - Transportation
    - Utilities
    - Other

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II EXECUTIVE SUMMARY

II   EXECUTIVE SUMMARY

- This chapter summarizes key forecasts, issues, and trends that are discussed in more detail in the remainder of the report.

- This Executive Summary is prepared in a presentation format; i.e., the exhibits are set in larger type for ease of use with an overhead projector and the text is in script form. The script for each exhibit is contained on the left-hand page opposite the exhibit.

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A. SOFTWARE PRODUCTS TO CONTINUE TO LEAD FIVE-YEAR GROWTH

● Software products will be the fastest growing segment of the information services marketplace for the period 1985-1990. From a base of over $13 billion in 1985, software products will expand 25% annually. By 1990, they will emerge as a $41 billion opportunity. There are several major driving forces that are stimulating this market.

  - The long-term growth of the hardware installed base. The mainframe/mini installed base is expected to be 3.2 million units in 1990, while in the same year there are expected to be 20 million micros. Consequently, there will not be a lack of "boxes" on which to run software.

  - Technology price/performance improvements. Improvements in hardware configurations such as networks will stimulate the sale of new types of distributed software. (Distributed systems are obsoleting almost every piece of software on the market today, thereby creating opportunity for new product sales.) The inclusion of AI in software packages will make them easier to learn and use, which will in turn increase sales.

  - The acceptance by top management of automation as a competitive edge. Once management is willing to invest money in automation, in many cases they will be unwilling to wait for internally developed solutions and will instead opt for packaged software. In addition, once end users are comfortable with simple computer applications, they will look for ways to be more creative/productive and hence will purchase more complex software.

  - Increased systems standardization such as communication protocols (and standards within industries). This important trend toward commonality will increase the potential sales base of most software vendors' products.

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EXHIBIT II-1

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SOFTWARE PRODUCTS TO CONTINUE
TO LEAD FIVE-YEAR GROWTH

AAGR
1985-
1990

Software Products — $13.3 / $41.2 — 25%

Processing Services — $17.3 / $36.6 — 16%

Professional Services — $10.5 / $26.3 — 20%

Turnkey Systems — $7.4 / $17.4 — 19%

0   10   20   30   40 $50

U.S. User Expenditures ($ Billions)

| 1985 | $48.5 | 20% |
| 1990 | $121.4 | |

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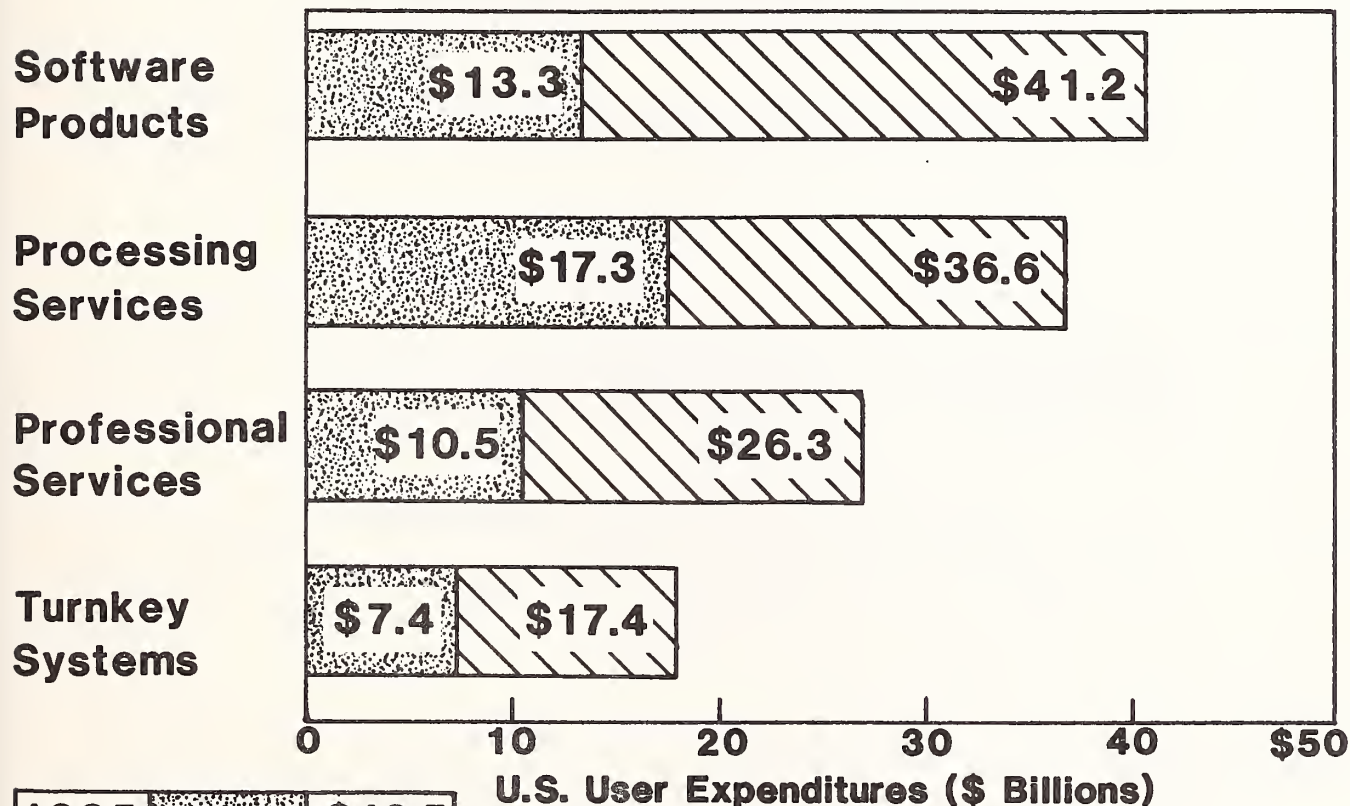
B.   WHY THE RECENT SLOWDOWN?

- The overall software market is experiencing a temporary slowdown. In 1983-1984, the software market increased by 34%, but then decreased to a 20% growth in 1984-1985. This slowdown is due primarily to:

    - The state of the U.S. economy that is placing budget constraints on companies and restricting software product purchases.

    - Purchaser confusion that is stemming from increasing competition from the large number of software vendors as well as the variety of product choices.

    - Fear by purchasers of product reliability due to highly publicized problems with several higher-priced software products. With fear comes caution, and thus a longer selling cycle.

    - The long installation time of large complex software systems that many companies opted to purchase in the near past has put a temporary hold on followup or add-on purchases.

- INPUT expects this market slowdown to be temporary, and as the afore-mentioned negative forces wane, the market will continue its healthy growth.

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EXHIBIT II-2

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WHY THE RECENT SLOWDOWN?

- **State of Overall Economy**

- **Increased Competition**

- **Confusion**

- **System Failures – Credibility**

- **Absorption Bottleneck**

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C.   MAINFRAME/MINI SEGMENT CONTINUES TO EXPERIENCE CHANGES

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- Mainframe/mini software products accounted for almost 80% of the overall software products market in 1985. With an AAGR of 23%, the market is expected to reach over $30 billion by 1990. The changing character of this marketplace is heavily impacted by pricing and distribution channels.

- Mainframe/mini software products experienced a lower than expected growth rate over the past two years. INPUT expects that price levels for these products in general will increase approximately 4% over the next two years. This will be primarily due to increased user demand and management focusing again on company long-term strategy that will lessen price discounting.

- Mainframe software products have primarily been sold through direct sales; mini products through hardware vendors and VARs. Software product vendors will increasingly seek alternative distribution channels as a way of controlling their heavy marketing and sales expenses. New distribution channel opportunities that will exist include:

  - Using customers to sell systems, such as a bank selling a software vendor's cash management package to large corporate clients.

  - Selling the software products to either hardware or software product vendors to be imbedded in their products--an example is ADR selling their Datacom DB to applications software vendors for a more integrated product line.

  - And finally, and in many ways the most valuable distribution opportunity for software vendors in the future, licensing a product to IBM. An example of this is UCCEL's selling of UCC TWO (DUO) to IBM after marketing it by themselves for years.

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EXHIBIT II-3

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MAINFRAME/MINI SEGMENT
CONTINUES TO EXPERIENCE CHANGES

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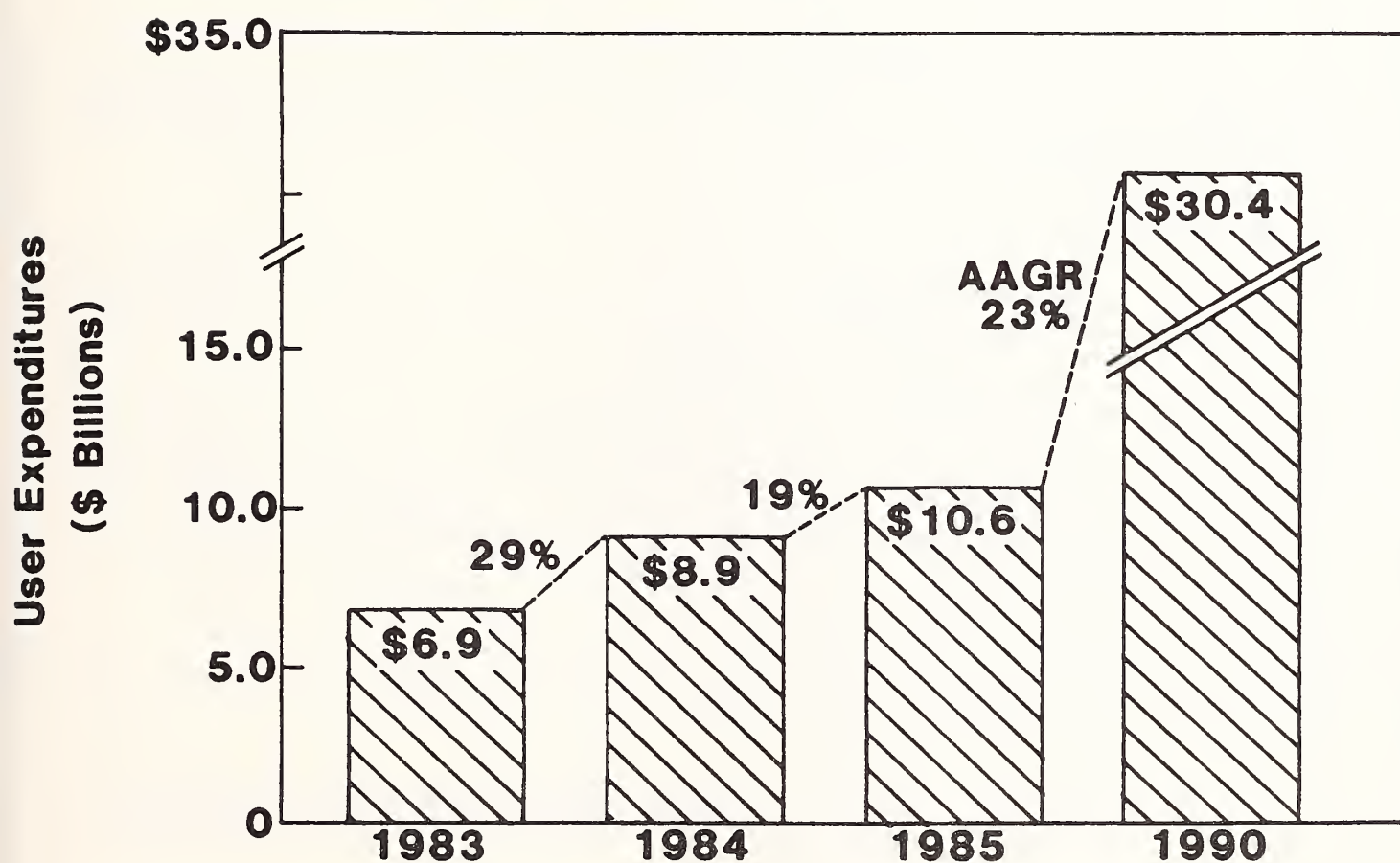
D.   MICRO SOFTWARE MARKET TO SHOW HEALTHY FIVE-YEAR GROWTH

- In 1990, the installed base of micro hardware will be double what it is today--8.5 million units versus 20 million units. Consequently, there will be a more than two-fold increase in the number of repositories for software in five years. This means there will be no real shortage of hardware that needs software to be useful.

- In 1983-1984, user expenditure micro software growth was 120%. This annual growth decreased to 23% in the 1984-1985 period, primarily due to the very low dollar base of micro software in 1983 as well as industry consolidation--the rich get richer and the poor leave the industry.

- The five-year average annual growth rate of 32% for this five-year period outpaces the 25% growth for the software market as a whole.

- By 1990, the annual expenditure for micro software will be four times larger in spite of the fact that the hardware base will only double. The micro software penetration will continue unabated as automation permeates all facets of U.S. business.

- Factors impacting this market are:

    - Technology price/performance improvements stimulating both hardware and software purchases.

    - Large corporations' acceptance of microcomputers as productivity enhancement tools.

    - The trend toward distributed data processing creating the demand for multiuser and networked micro software packages.

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EXHIBIT II-4

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MICROCOMPUTER MARKET TO SHOW
HEALTHY FIVE-YEAR GROWTH

*Average Annual Growth Rate

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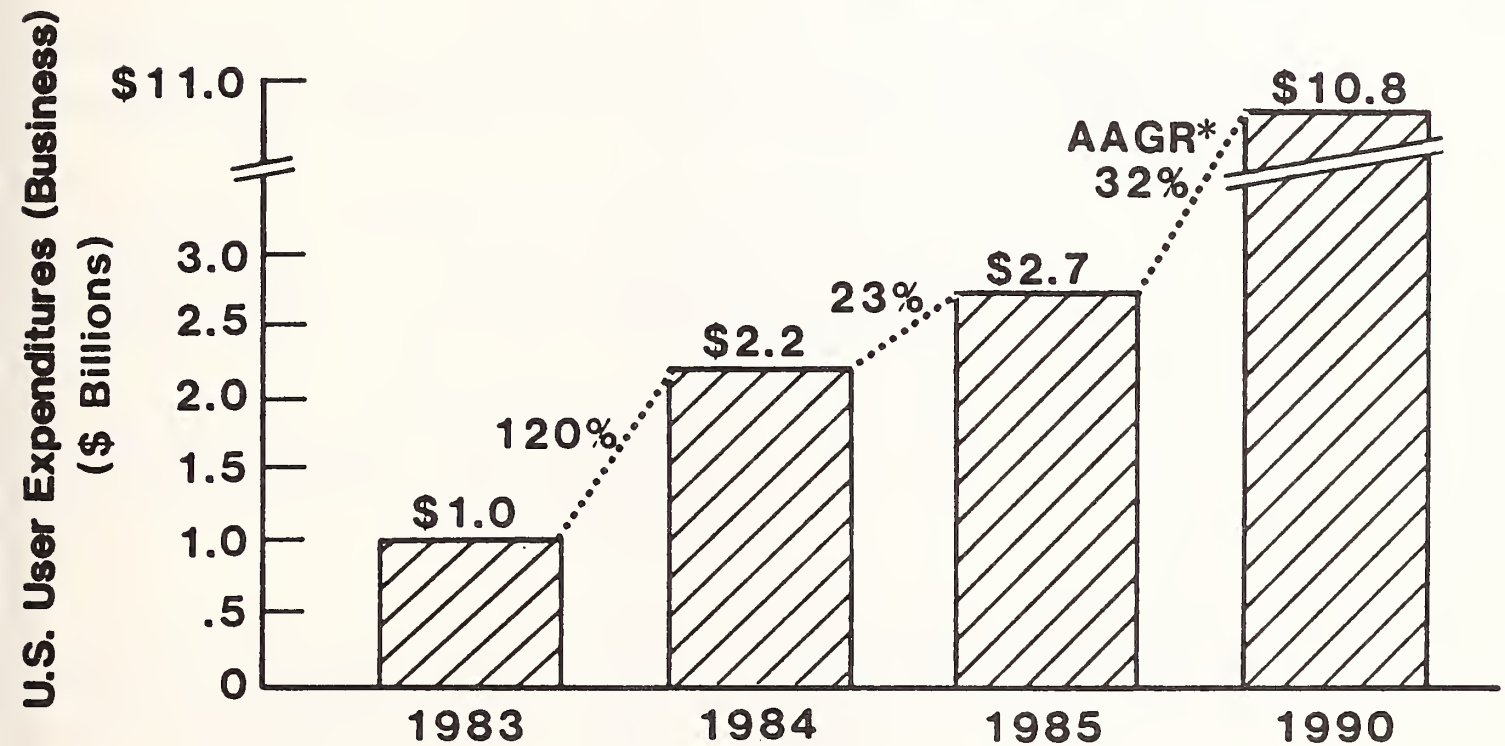
E. SYSTEMS SOFTWARE MARKET TO TRIPLE BY 1990

- The systems software market continues to experience healthy growth. In 1985, over $6 billion was spent on systems software. With an expected 25% AAGR, almost $20 billion will be spent in 1990.

- Of the 1985 user expenditures, approximately 57% was for mainframe packages, 31% for mini packages, and 12% for micro packages. By 1990, micro software will comprise 20% of systems software expenditures. This significant increase in micro software market share is a reflection of the more than doubled micro hardware installed base combined with high end-user interest in do-it-yourself applications solutions.

- The application development tool market will have the highest average annual growth rate (30%) of all the systems software segments for the period 1985-1990. The micro portion of the market will grow from 14% in 1984 to 23% in 1990. This will be due to a large increase in micro DBMS sales as well as to the proliferation of mainframe-based tools that will have fully compatible micro versions.

- The data center management market is expected to more than double within the forecast period. This growth is being fueled mostly by end-user computing and distributed data processing, both of which create more complex hardware combinations that require software for proper management.

- In 1990 the systems control market will account for over $6 million in user expenditures as a result of a 23% AAGR. This will make the systems control sector in 1990 nearly as large as the entire systems software market in 1985. The increasing use of LANs and micro-mainframe links as well as the need for better data security will contribute significantly to the growth of this software category.

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EXHIBIT II-5

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SYSTEMS SOFTWARE MARKET
TO TRIPLE BY 1990

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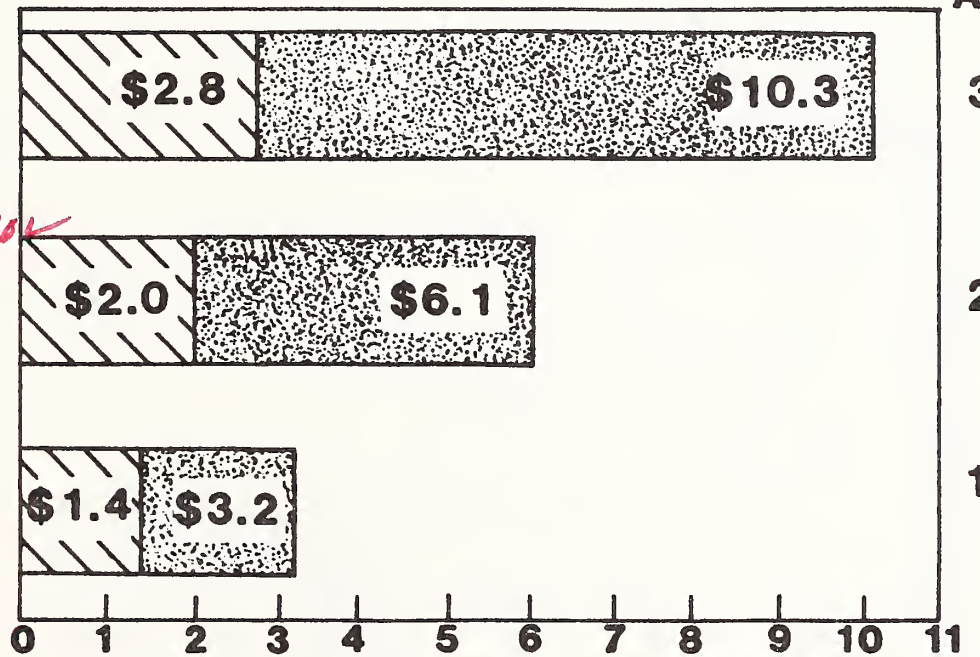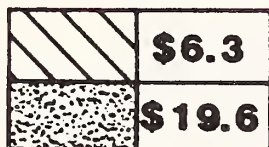
Application Develpment Tools

BD

~~Data Center Management~~ *SYSTEMS CONTROL*

DATA CTR MGT
~~Systems Control~~

$2.8 $10.3   30%

$2.0 $6.1   23%

$1.4 $3.2   18%

0 1 2 3 4 5 6 7 8 9 10 11

U.S. User Expenditures ($ Billions)

1985 $6.3
1990 $19.6   **25%** **AAGR**

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F. APPLICATIONS SOFTWARE INDUSTRY-SPECIFIC SEGMENTS TO INCREASE SIGNIFICANTLY

- The applications software market is expected to have the same AAGR 1985-1990 as systems software (25%). The mainframe/mini versus micro percent of the market is expected to remain almost constant at 70% versus 30%.

- The overall applications software market cross-industry segment will have a 19% growth during the forecast period, as opposed to the industry-specific segment that will have a 32% AAGR.

- This "tilt" toward industry-specific applications will be due to:

  - Maturing of the cross-industry market which has become more saturated.

  - Generally higher average unit price for industry-specific packages.

  - Management preference toward industry-specific solutions for auto-mating "the heart" of the business.

- From a user expenditure perspective, rankings of the top three industry-specific segments in 1985 and 1990 will be relatively similar: banking and finance = 1; discrete manufacturing = 2; and medical = 3.

- Stimulants to these major markets include: deregulation and the ensuing increased competition in the banking and finance segment; strong competition from abroad forcing cost-effective solutions in the discrete manufacturing segment; and due to government pressure, the need to contain costs in the medical industry.

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EXHIBIT II-6

APPLICATIONS SOFTWARE INDUSTRY-SPECIFIC SEGMENTS TO INCREASE SIGNIFICANTLY
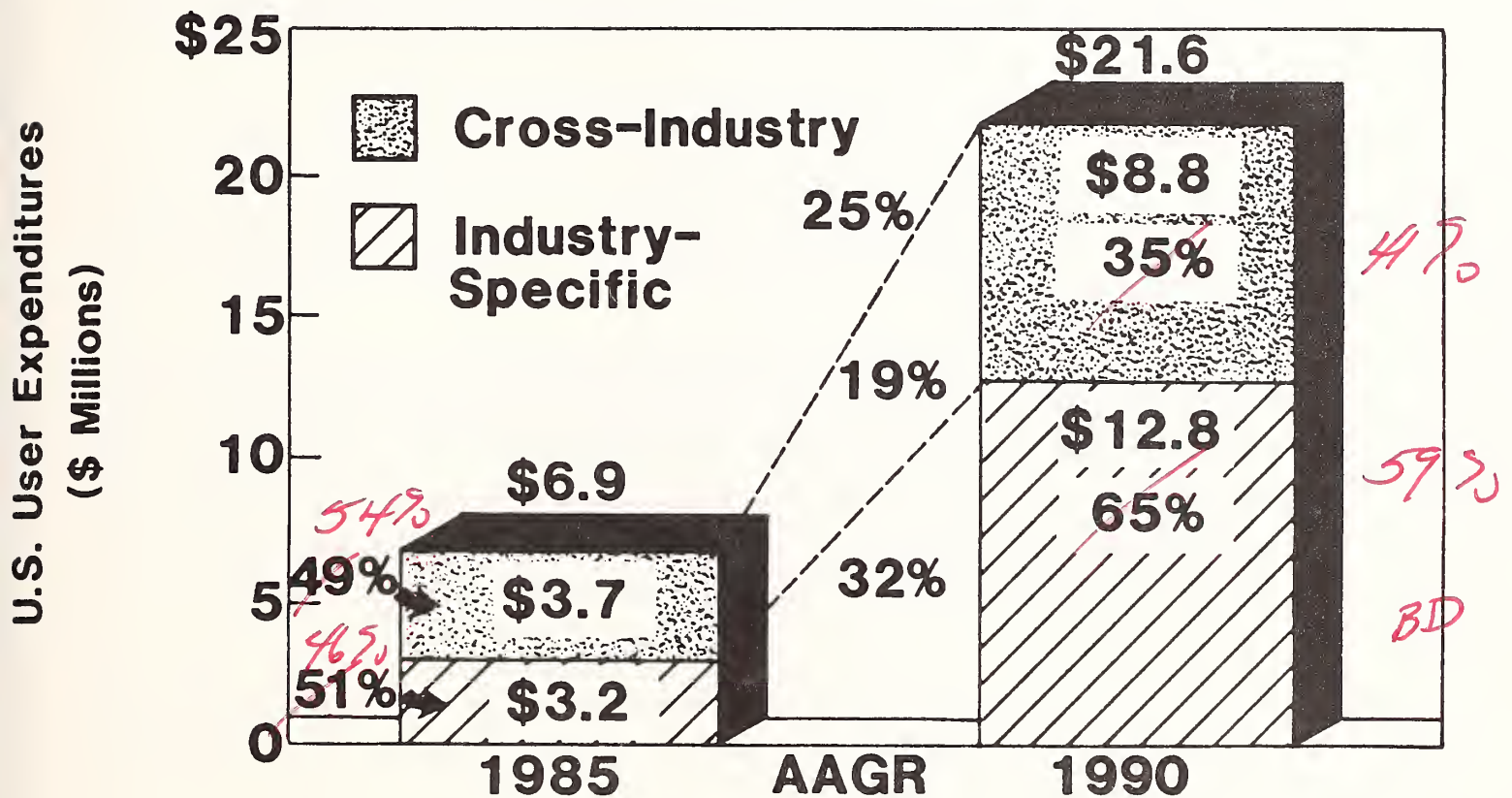
G.   CONCLUSIONS

- The software market will continue to be a healthy market, but only for well-managed and well-financed vendors. Although 1985 was a year of lesser than expected growth, mid-to-late 1986 will be a time of renewed sales with a 28% growth expected between 1985-1986.

- Information systems (IS) managers are becoming increasingly "pro" software products. As top management views automation as a competitive edge, the pressure for "results now" favors software product licensing.

- Rapid product obsolescence will continue to occur during the next five years due to the impact of technology changes and aggressive vendor new product developments.

- Larger firms that are primarily in other businesses, but which have software affiliates, will continue to increase their share of the software market. This directly impacts most software-only vendors who will find it harder to compete without easy access to ever-increasing financial resources for product development and marketing.

- Expansion of product lines into new markets by software vendors is essential for growth but is complicated to manage. It will, however, be a key skill for the balance of the 1980s.

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EXHIBIT II-7

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CONCLUSIONS

- **Overall Software Market Outlook Healthy**

- **I.S. Managers "Pro" Software**

- **Rapid Product Obsolescence**

- **Increased Competition by Large Non-Independent Vendors to Continue**

- **Expansion of Product Lines Is Essential**

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H.   RECOMMENDATIONS

● To take advantage of the opportunities available in the software marketplace, vendors should:

  - Integrate product lines. Systems should be designed so they can be easily integrated with related applications either now or later.

  - Spend more effort tracking and evaluating new technology. Technology will continue to be a major factor in product differentiation and consequently its creative use will be a key to vendor success.

  - Be more aggressive internally with the use of systems development tools that can enhance the productivity of R&D efforts.

  - Evaluate alternate distribution channels, such as sub-contracting to system integration vendors who win large contracts for acquiring, combining, and installing complex hardware/software systems.

  - Emphasize customer service. Post-sales support is a major opportunity for vendors to acquire a predictable annual revenue stream as well as better satisfy customers who will then return for future products.

  - Be on the lookout for partners. Aggressively seek partnering activities, be they acquisitions, joint ventures, or R&D partners. This will help increase chances for sales opportunities, especially in markets where the window of opportunity is narrow.

  - Focus on recurring revenues. Place more emphasis on monthly rather than up-front, one-time payments. This increases vendor financial stability plus helps stimulate sales to buyers with short-term budget pressures.

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EXHIBIT II-8

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RECOMMENDATIONS

- **Integrate Product Lines**

- **Track and Utilize Emerging Technology Early**

- **Evaluate Alternative Distribution Opportunities**

- **Emphasize Service**

- **Aggressively Look For Partnering Activities**

- **Develop Recurring Revenue Stream**

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III MARKET SIZE AND GROWTH

III   MARKET SIZE AND GROWTH

A.   MARKET FORECASTS

1.   OVERALL MARKET, 1985-1990

a.   Overview

- Software products is the growth star of the 1985-1990 information services marketplace. From a base of over $13 billion in 1985, software products will outperform all other modes by expanding 25% annually. By 1990, it will emerge as a $41 billion opportunity, thus making software products larger than the entire information services market in 1985 (see Exhibit III-1).

- From an historic perspective of the information services industry, the software market was 8% in 1970 and is expected to grow to over 30% by 1990--doubling in market share every 10 years (see Exhibit III-2).

- In 1990, the information services offerings by computer/communications hardware firms and subsidiaries of larger companies will more than double. In 1985, information services revenue by these companies was over 10% of total. In the software market specifically, these types of suppliers will go from almost 50% of the market in 1985 to almost 70% in 1990.

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EXHIBIT III-1

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SOFTWARE PRODUCTS MARKET FORECAST: 1985-1990

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EXHIBIT III-2
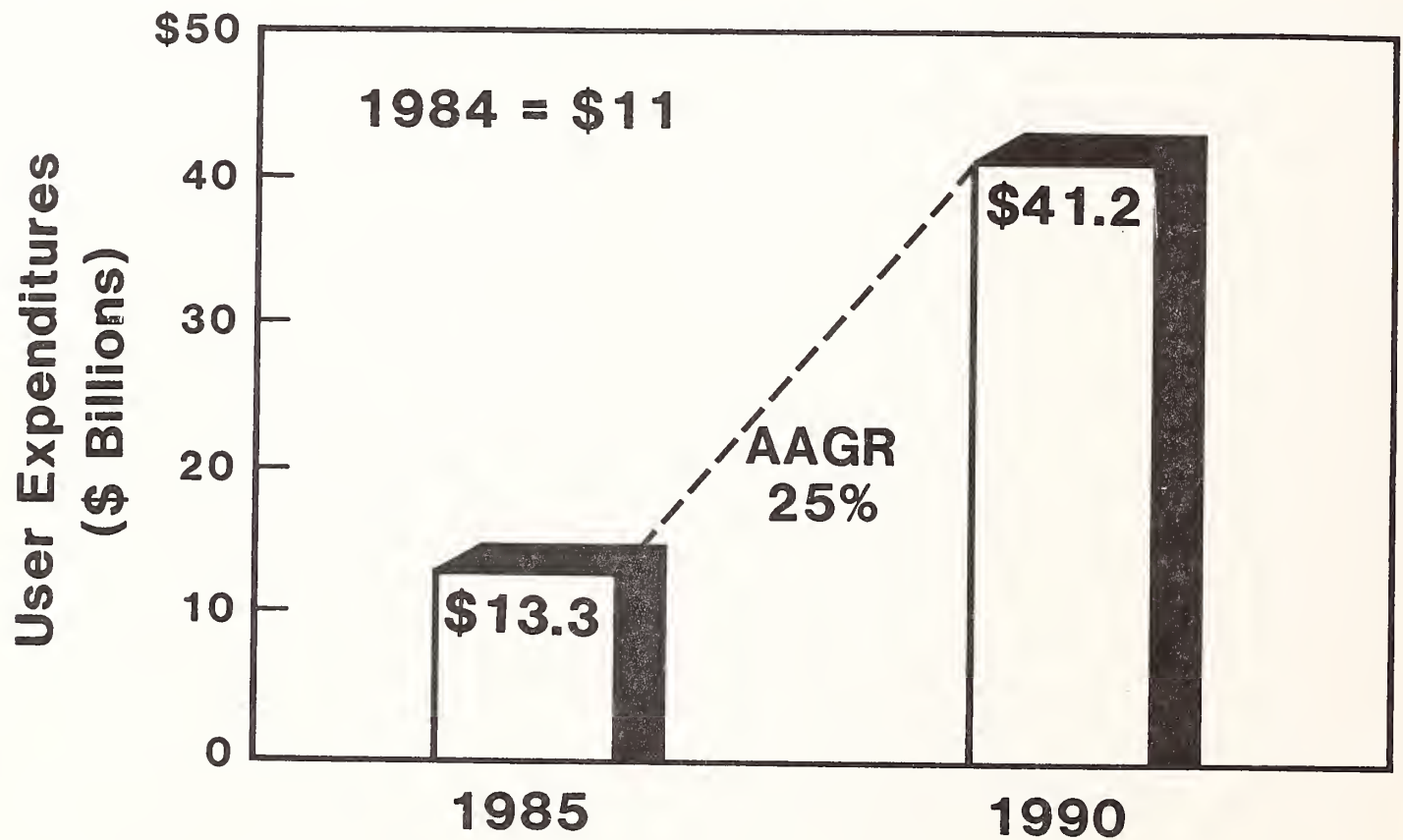
SOFTWARE PRODUCTS PORTION
OF INFORMATION SERVICES
(1970-1990)
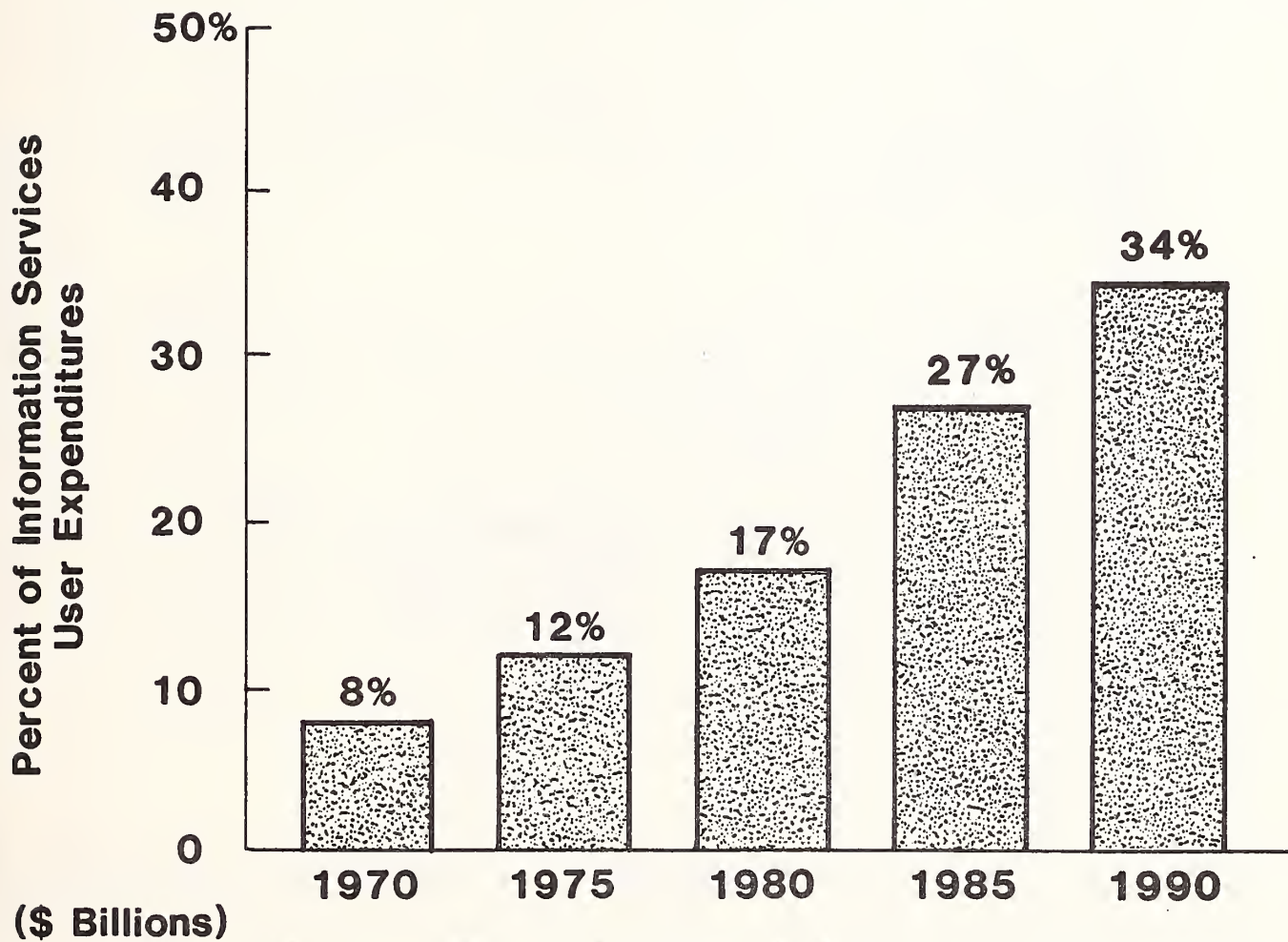
($ Billions)	1970	1975	1980	1985	1990
Software Products	$0.3	0.7	2.9	13.3	41.2
Total Information Services	$3.2	5.7	17.0	48.6	122.2

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- The active participation of hardware vendors in the systems software market is a major force behind these market shares.

- An example of the aggressiveness of one industrial segment--telecommunications vendors--is Ameritech's acquisition of ADR in late 1985, the largest software product company acquisiton in history.

- In 1984, of total user expenditures, 47% were for mainframe products, 33% were for mini products, and 20% were for micro products. In 1990, the micro portion of the market is expected to be almost 27% of the overall software market, due primarily to the large increase in microcomputers in business and more sophisticated users purchasing more complex and higher priced software products (see Exhibit III-3).

- Vendors with more than $10 million in revenue accounted for about 65% of user expenditures in 1984. This percentage for large vendors will tend to increase as the software products market continues to mature.

- Both applications software and systems software segments are expected to have healthy 25% average annual growth throughout the forecast period (see Exhibit III-4). In the sections to follow, more specific analysis will be provided for both market segments.

b.   Driving Forces, 1985-1990

- There are several major driving forces that are stimulating the growth of the overall software industry.

- Since software needs hardware on which to run, the growth of the hardware installed base over a multi-year period has a major direct impact on software sales. In 1990, there are expected to be 3.2 million mainframe and minicomputers installed. In the same year, the micro installed base will reach 20 million units.

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EXHIBIT III-3

SOFTWARE PRODUCTS MARKET FORECAST, MAINFRAME/MINI AND MICRO: 1985-1990

EXHIBIT III-4
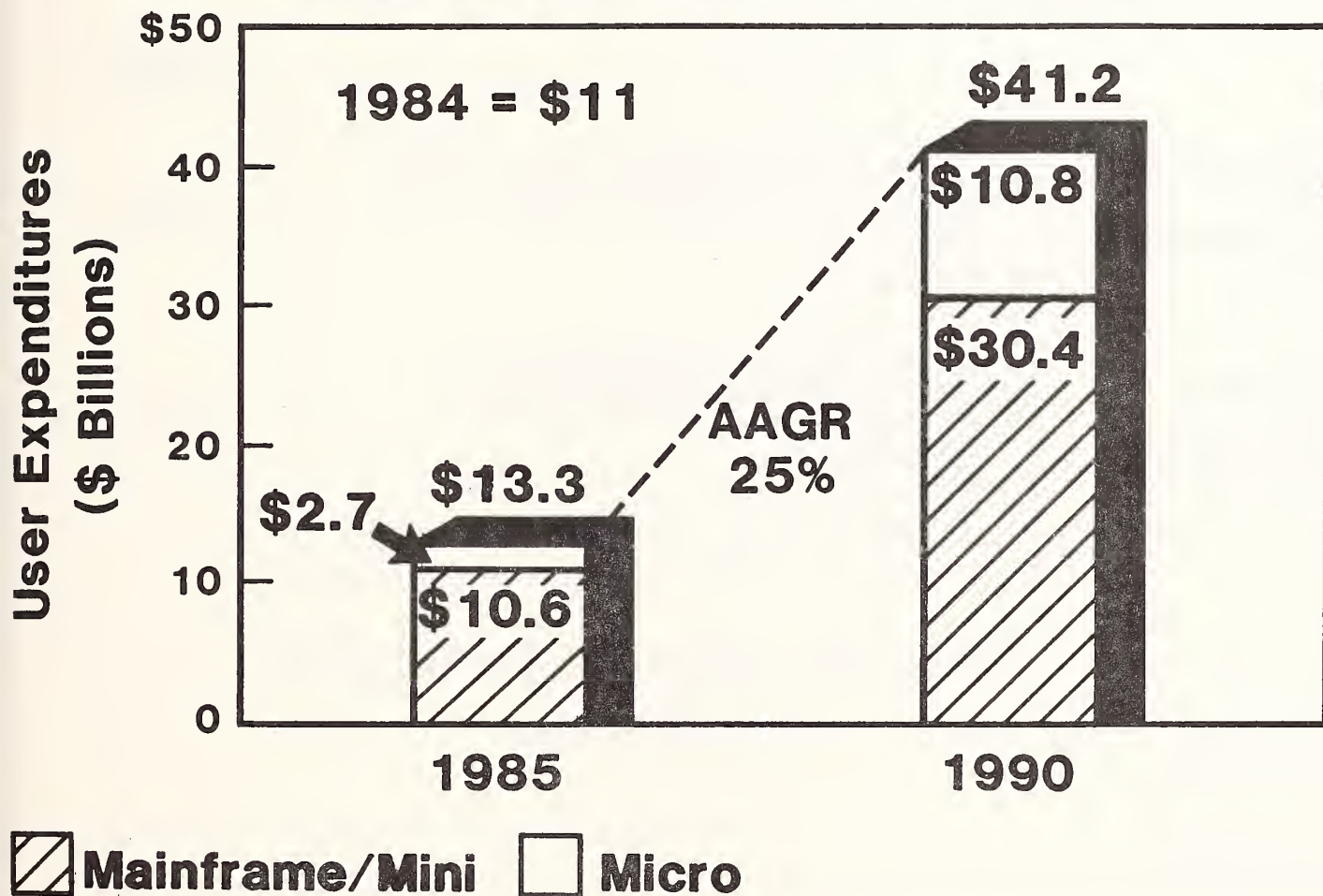
APPLICATIONS VERSUS SYSTEMS SOFTWARE
MARKET GROWTH: 1985-1990

Total U.S. User Expenditures
($ Billions)

1990
1985
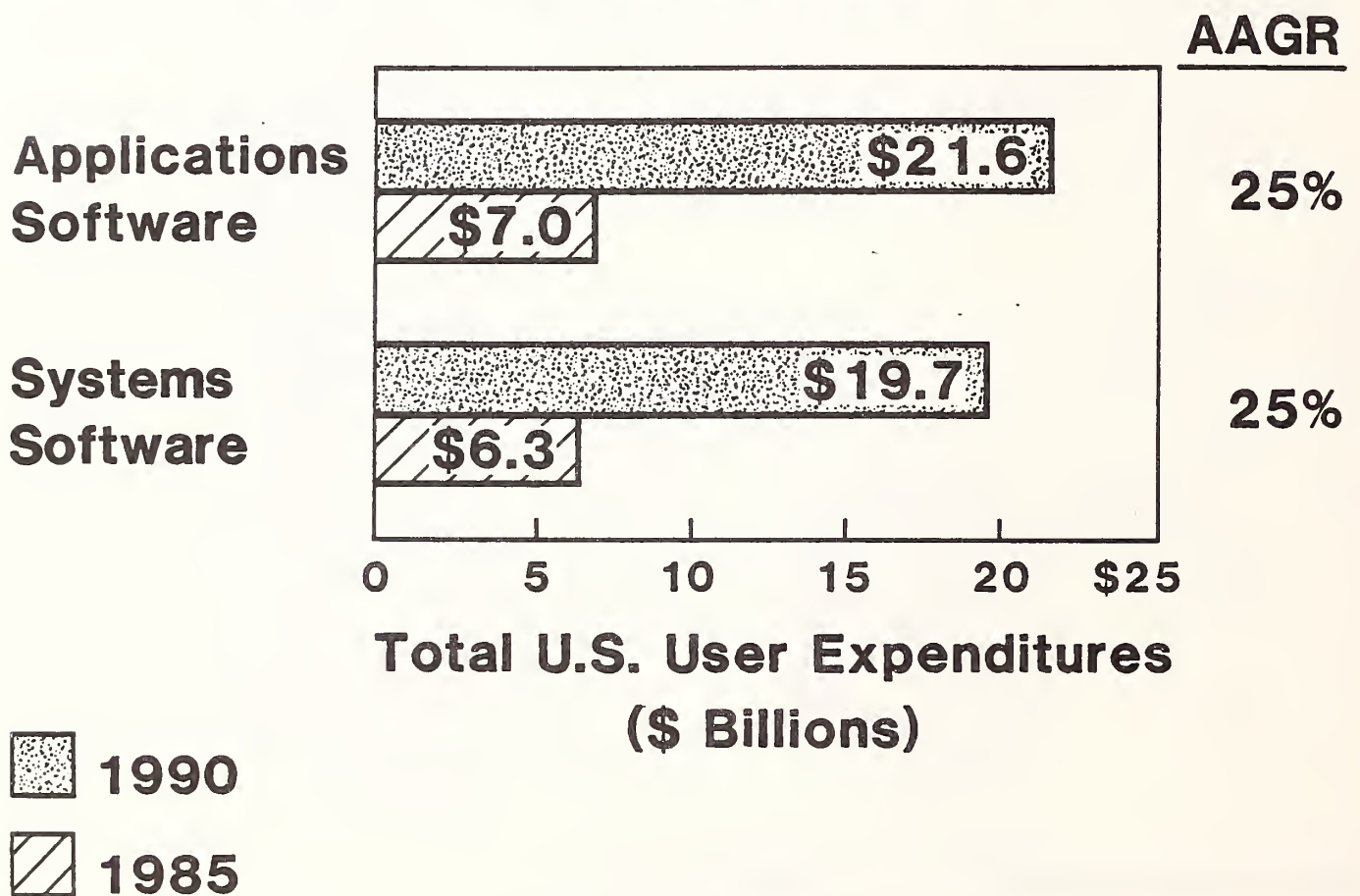
- Technology price/performance improvements will affect both software and hardware products. Networks and the inclusion of AI in software products are just two of the technological advances that will impact softwares sales in a positive way.

- Top management is coming to view automation as a competitive edge. Once management comes to this conclusion, impatience will occur and in many cases they will be unwilling to wait for internally developed solutions, instead purchasing packaged software.

- End-user computing demand affects software sales in every segment of the industry. Once people are comfortable with simple computer applications, they will look for ways to be more creative/productive and hence will stimulate the demand for more complex as well as a larger number of overall software packages.

- Increased systems standardization will increase the potential sales base of most software vendors' products. Vendors must be attuned to these evolving standards when designing or integrating products.

- Distributed systems are obsoleting almost every piece of software on the market, thereby creating opportunity for new product sales.

c.   Causes of Recent Slowdown

• The overall software market has experienced a slowdown in rate of growth as seen in Exhibit III-5. In 1983-1984, the software market increased by 34%, then decreased to a 20% growth in 1984-1985. This slowdown is due primarily to:

- The state of the economy that is placing budget constraints on companies and restricting software product purchases. In many cases,

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EXHIBTI III-5

SOFTWARE PRODUCTS GROWTH: 1981-1985

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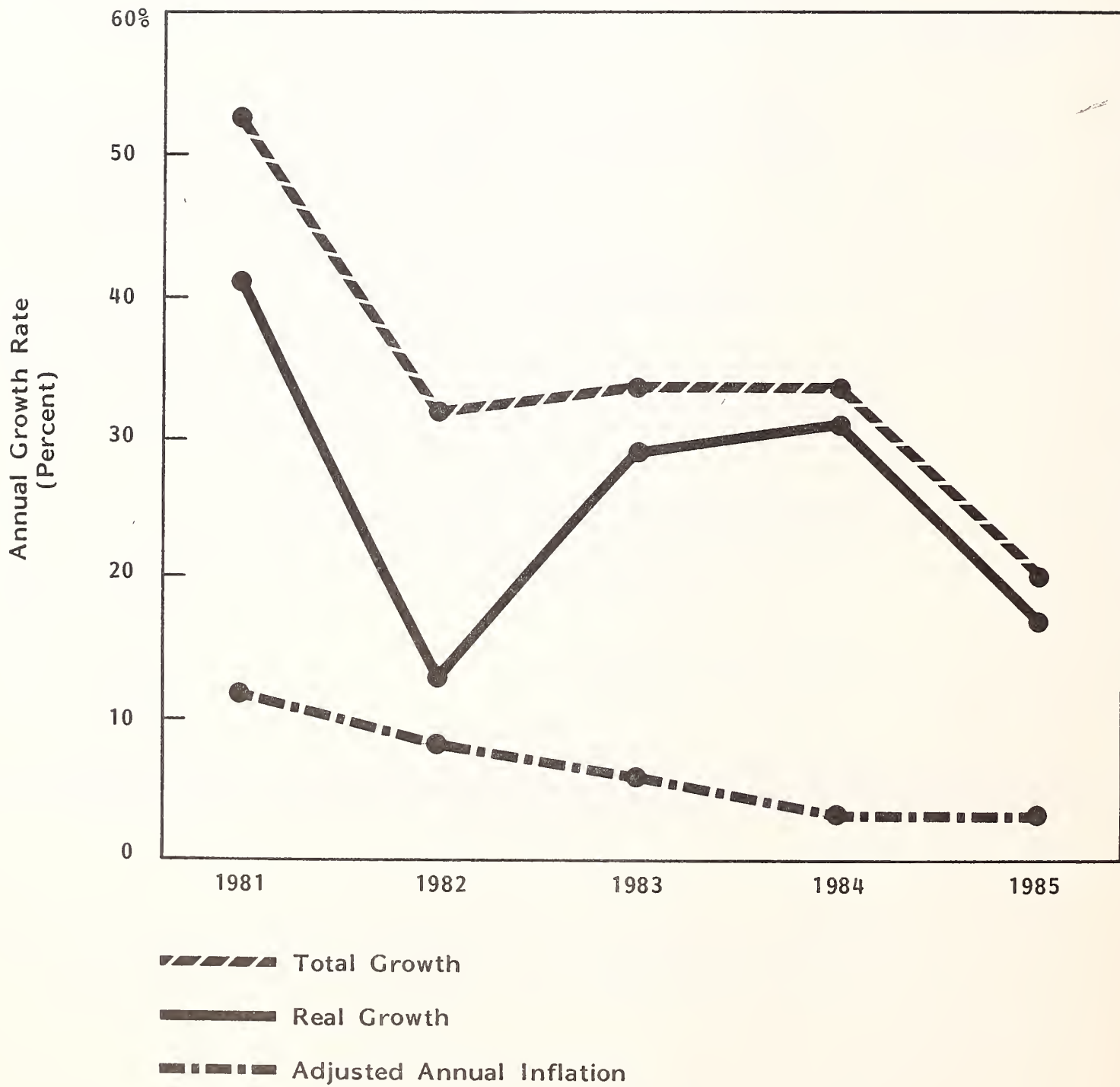
companies are opting to "live with" previously installed systems or do internal development with existing resources rather than purchase products from the outside.

- The increasingly aggressive competition from the large number of software product vendors as well as the multiplicity of product choices are creating confusion for potential purchasers and thereby increasing the selling cycle.

- Problems with the reliability of some higher priced software products have made purchasers wary of other large ticket items.

- In the recent past many companies purchased large complex software systems. The extensive amount of time needed to install these systems has put a hold on followup or add-on purchases.

• INPUT expects this market slowdown to be temporary and, as the aforementioned negative forces wane, the market will continue its healthy growth. Exhibit III-6 shows growth per year increasing after the 1984-1985 period.

    d.   Hardware Vendors versus Independents

        (i)   Hardware Vendors

• In 1984, hardware vendors accounted for over 36% of the total software user expenditures. Viewed by software product type, these vendors were distributed as follows:

- Thirty-eight percent mainframe software dollars.

- Forty-four percent mini software dollars.

- Eighteen percent micro software dollars.

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EXHIBIT III-6

ANNUAL SOFTWARE PRODUCTS MARKET GROWTH

	1984	1985	1986	1987	1988	1989	1990	AAGR 1985-1990
$ Billions	$11.1	13.3%	17%	22%	27.6%	33.9%	41%	–
Percent Growth Per Year	34%	20%	28%	29%	25%	23%	22%	25%

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- These percentages highlight the differing competitive structures of the software industries that will be elaborated on in sections to follow.

    (ii)   1984 Leaders

- In 1984, the top 10 software leaders accounted for 37% of the overall vendor revenue. This number includes only those revenues received by publishers, not those received by distributors or retailers. Exhibit III-7 lists the leading vendors and market share.

    - To be noted is the large market share by IBM. The company has stated its intent to have 40% of their overall corporate revenue in 1990 be from software products.

        . This would mean that IBM would receive $40 billion in software revenue worldwide (about $30 billion for U.S.).

        . This revenue, according to INPUT's software products forecast, would mean that IBM would have 73% of the U.S. market in 1990. INPUT does not support this projection. More likely for the computer giant is a 40-45% share by the end of the decade. INPUT does believe IBM software product market share will increase, but not from 23% in 1984 to 73% by 1990.

    - There were two mainframe and two micro software independents included in the top 1984 vendor list. The mainframe vendors (Cullinet and MSA) are well established vendors while the micro vendors (Lotus and Microsoft) have been market players for only about three years. As the industry continues to consolidate, newer players to the market, unless they are extremely well-managed and financed, will not be as likely to gain Top 10 ranking.

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EXHIBIT III-7

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SOFTWARE PRODUCT LEADERS, 1984

RANK	COMPANY	VENDOR REVENUES ($ Millions)	MARKET SHARE (Percent)
1	IBM	$2,250	23%
2	NCR	250	3
3	Hewlett-Packard	230	2
4	DEC	210	2
5	Burroughs	180	2
6	Cullinet	144	1
7	Lotus	140	1
8	Sperry	130	1
9	Microsoft	123	1
10	MSA	120	1

Total 1984 Software Product Vendor Revenues = $10,000 Million

Top 10 = 37% of Market

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(iii)   Public Software Product Companies

- The 27 public software companies included in INPUT's Vendor Financial Watch sample in Exhibits III-8 and III-9 accounted for 17% of the revenues of the software industry in 1984.

- Exhibit III-10 highlights the cooling of the industry during last quarter 1984 and first quarter 1985 by revenue and net income growth. Second and third quarter 1985 do, however, show a beginning of an industry recovery.

- This recovery trend shows that although software product vendors have had a rough 1985, the cost containment strategies most have implemented, as well as the easing of the aforementioned negative industry factors, have strengthened the remaining viable vendors in the industry and are helping to prepare them for continued growth.

e.   Mainframe/Mini/Micro

(i)   Mainframe/Mini

- Mainframe/mini software products will account for almost 80% of the overall software products market in 1985. With an AAGR of 23%, the market is expected to reach over $30 billion by 1990 (see Exhibits III-11 and III-12).

- In contrast to the micro software vendors, mainframe/mini sellers are characterized by:

  -    More stable, well established organizations.

  -    More experienced management.

  -    More control of distribution channels (via direct sales).

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EXHIBIT III-8

REVENUES OF PUBLIC SOFTWARE PRODUCTS COMPANIES

COMPANY NAME	FISCAL YEAR END	REVENUE ($ Thousands) 1983 Q4	1983 TOTAL	1984 Q1	Q2	Q3	Q4	TOTAL	1985 Q1	Q2	Q3	GROWTH 1984/1983 %(+/-)	LAST 3 ROLLING QUARTERS	LAST 2 ROLLING QUARTRS
ADR	12-31	30151	89086	21549	28523	33663	44469	128204	34300	30083	39316	44	24	12
AMERICAN S/W	04-30	6201	19161	5657	6581	7199	7992	27419	7813	8828	10188	43	38	38
APPLIED COMM	09-30	3567	15674	5676	6697	6875	5490	24738	6833	7997	8128	58	19	19
ASHTON TATE	01-31	13545	39846	11207	19193	24709	27172	82281	23971	27501	28590	106	45	28
BGS SYSTEMS	01-31	3617	9192	2546	2500	2349	3531	10926	2886	3157	3396	19	28	35
BPI SYSTEMS	03-31	2452	9335	2635	2495	2800	1692	9622	2361	2344	2519	3	-9	-8
COMSERV	12-31	5000	16321	5497	6291	6326	6771	24875	4520	8824	6180	52	8	19
COMPUTER AS.	03-31	26070	76694	24528	22009	31056	38766	116359	37169	31257	41994	52	42	38
CONTINUUM	03-31	8520	28059	8314	9157	9999	11410	38880	17827	13945	14035	39	67	46
CULLINET	04-30	31386	108358	35149	40265	43684	47423	166521	52728	42277	43167	54	16	2
CYBERTEK	03-31	4158	16517	6021	4790	5359	5758	21928	5482	4529	5408	33	-5	-2
DUQUESNE SYS	09-30	1659	5364	1871	2088	2294	2474	8727	2663	2870	3070	63	38	36
HEALTH SYS	06-30	1972	7513	3303	4400	1712	1713	11128	100	714	1516	48	-75	-64
HOGAN SYST.	03-31	7212	24978	16469	6695	11342	4604	39110	5604	4066	6586	57	-53	-41
INFORMATICS	12-31	59756	197892	50921	50076	53835	56982	211814	49918	55443		7	-32	-47
INF. SCIENCE	04-30	8989	25801	12087	7336	6626	8038	34087	6849	6589	4389	32	-32	-21
INNOVATIVE	06-30	656	1942	707	489	1380	1833	4409	1495	1382	2594	127	112	113
INT.SOFT.SYS	12-31	8686	24177	5904	6970	8852	11906	33632	7663	8673	11167	39	27	25
LOTUS DEV.	12-31	23903	53006	28269	32628	45649	50432	156978	44679	59276	49724	196	44	39
MSA	12-31	58163	145176	28369	28541	28516	56390	141816	24974	38124	30919	-2	10	21
MICROPRO INT'L	08-31	20555	59159	18887	15661	12384	11679	58611	9959	10275	10736	-1	-34	-25
NCA CORP	12-31	5181	17974	5501	6113	5115	6853	23582	5194	6054	5869	31	2	6
ON-LINE S/W	05-31	7777	26935	6666	6182	6583	6891	26322	7322	8226	7751	-2	20	25
PANSOPHIC	04-30	16125	49918	14966	12505	16658	20050	64179	18117	16257	18883	29	21	20
POLCY MGMT	12-31	17487	62268	19276	20977	21316	23246	84815	25032	25725	25736	36	24	22
SCIENTIFIC S	12-31	11600	30893	10323	9142	8332	11084	38881	7429	8144	7907	26	-16	-8
SOFTECH	05-31	12222	41624	10922	10884	7990	9054	38850	8998	10391	9520	-7	-3	5
SOFTWR AG	05-31	9906	35030	10528	12030	11938	12657	47153	12055	14110	16036	35	22	26
SOFTWR PUB	09-30	5577	5577	4523	5978	8061	11454	30016	7000	7889	7121	438	19	7
SW SVC AMER	05-31	89	578	60	351	798	625	1834	606	405	228	217	2	-45
‡ STERLING S/W	09-30	4251	12376	4797	4582	5063	4850	19292	6043	6751	42456	56	283	410
STOKHLDR SYS	03-31	2092	7014	2717	2168	3402	3191	11478	3268	2595	3735	64	16	14
UCCEL	12-31	44550	152963	39042	42974	42709	48708	173433	46144	48943	50587	13	17	16
VM SOFTWARE	12-31	1255	5016	1695	2691	2731	3982	11099	3191	4206	4258	121	64	56
TOTALS		464330	1421417	426572	439962	487295	569170	1922999	500193	527850	523709	35	15	13

‡ REFLECTS ACQ.OF INFORMATICS. PENDING RESTATEMENT

34 COMPANIES

LAST UPDATED: 12-15-85

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EXHIBIT III-9

NET INCOME OF SOFTWARE PRODUCTS COMPANIES

| COMPANY NAME | FISCAL YEAR END | NET AFTER TAX INCOME (S Thousands) | | | | | | | | | | GROWTH (Percent) | | |
		1983 Q4	TOTAL	1984 Q1	Q2	Q3	Q4	TOTAL	1985 Q1	Q2	Q3	1984/1983 %(+/-)	LAST 3 ROLLING QUARTERS	LAST 2 ROLLING QUARTRS
ADR	12-31	4109	7460	333	1694	2542	5093	9662	600	-3140	228	30	-151	-169
AMERICAN S/W	04-30	1382	3994	961	1181	1235	1666	5043	1388	1282	1495	26	23	15
APPLIED COMM	09-30	-401	972	673	926	1007	147	2753	734	1395	1218	183	29	35
ASHTON TATE	01-31	1765	6230	149	682	3483	3149	7463	2344	3456	4800	20	146	98
BGS SYSTEMS	01-31	622	1335	143	92	23	860	1118	354	363	477	-16	363	630
BPI SYSTEMS	03-31	386	2027	269	-72	-1563	-714	-2080	-212	56	115	-207	97	111
COMSERV	12-31	-1090	-5813	-2840	-1874	-1135	-9747	-15596	-1967	1775	-519	-168	88	142
COMPUTER AS.	03-31	4610	8446	2694	1024	2271	6293	12232	3562	1397	3196	45	37	41
CONTINUUM	03-31	935	2703	518	1374	1107	1179	4178	2064	169	98	55	-22	-89
CULLINET	04-30	4230	15218	4812	5501	5977	6354	22644	6900	4233	3638	49	-9	-31
CYBERTEK	03-31	240	906	995	454	330	273	2052	479	-334	-141	121	-100	-159
DUQUESNE SYS	09-30	347	878	354	399	407	586	1737	582	564	640	98	55	51
HEALTH SYS	06-30	23	-150	473	666	-348	-348	443	-1223	-1259	-883	395	-532	-786
HOGAN SYST.	03-31	622	3607	4673	-1485	1007	-1352	2843	-12018	-2992	-443	-21	-468	-615
INFORMATICS	12-31	4354	8546	673	-1115	1150	4133	4680	68	-579		-45	-193	-360
INF. SCIENCE	04-30	409	1738	1554	-1050	-1808	-5219	-7526	-2947	-847	-2791	-533	-494	-27
INNOVATIVE	06-30	-16	-19	-162	-1420	-812	-568	-2992	-298	-584	550	-15647	86	98
INT.SOFT.SYS	12-31	1580	3002	247	472	1184	2325	4223	420	513	1397	41	27	21
LOTUS DEV.	12-31	6773	14316	7495	7647	9102	11802	36045	9671	10744	6361	152	10	2
MSA	12-31	10175	10769	494	-1562	-1793	3212	343	-2721	3063	-3493	-98	-6	93
MICROPRO INT'L	08-31	2902	9271	3130	620	-756	-620	2374	-570	468	1229	-74	-72	1348
NCA CORP	12-31	274	1107	307	265	-502	155	225	-1202	-55	-528	-80	-2650	-146
ON-LINE S/W	05-31	787	2067	-241	-1149	-349	194	-1545	789	646	446	-175	185	173
PANSOPHIC	04-30	3382	8648	2197	1174	3001	4374	10746	3266	2038	3355	24	36	29
POLCY MGMT	12-31	2724	9728	3070	3371	3587	3680	13708	3827	3994	3513	41	13	8
SCIENTIFIC S	12-31	1509	3007	634	102	495	827	1969	-342	147	601	-35	-64	47
SOFTECH	05-31	145	1907	301	547	-347	135	636	198	-1357	442	-67	-323	-758
SOFTWR AG	05-31	1293	3141	1662	1783	1873	1876	7194	1275	990	2980	129	-7	6
SOFTWR PUB	09-30	1104	1104	493	1069	977	2366	4905	972	992	845	344	11	-10
SW SVC AMER	05-31	-309	-699	-399	-171	-43	100	-513	175	-480	-191	15	19	-214
# STERLING S/W	09-30	170	1067	340	335	245	247	1167	641	576	1459	9	191	251
STOFHLDR SYS	03-31	378	1217	375	394	667	524	1870	514	350	710	54	17	9
UCCEL	12-31	1250	200	779	1649	3583	6024	12035	2362	3560	3022	5918	49	26
VM SOFTWARE	12-31	380	1518	157	527	339	784	1807	719	591	669	19	54	45
TOTALS		57140	129542	37303	23777	35949	48759	145789	19341	31395	34386	13	-12	19

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EXHIBIT III-10

PUBLIC SOFTWARE PRODUCTS VENDORS

Revenue ■━━━━━■

Income ●━━━━━●

*Percentages are current period ersus a year earlier

Last Update: 10-01-85

EXHIBIT III-11

MAINFRAME/MINI SOFTWARE EXPENDITURES
U.S. BUSINESS

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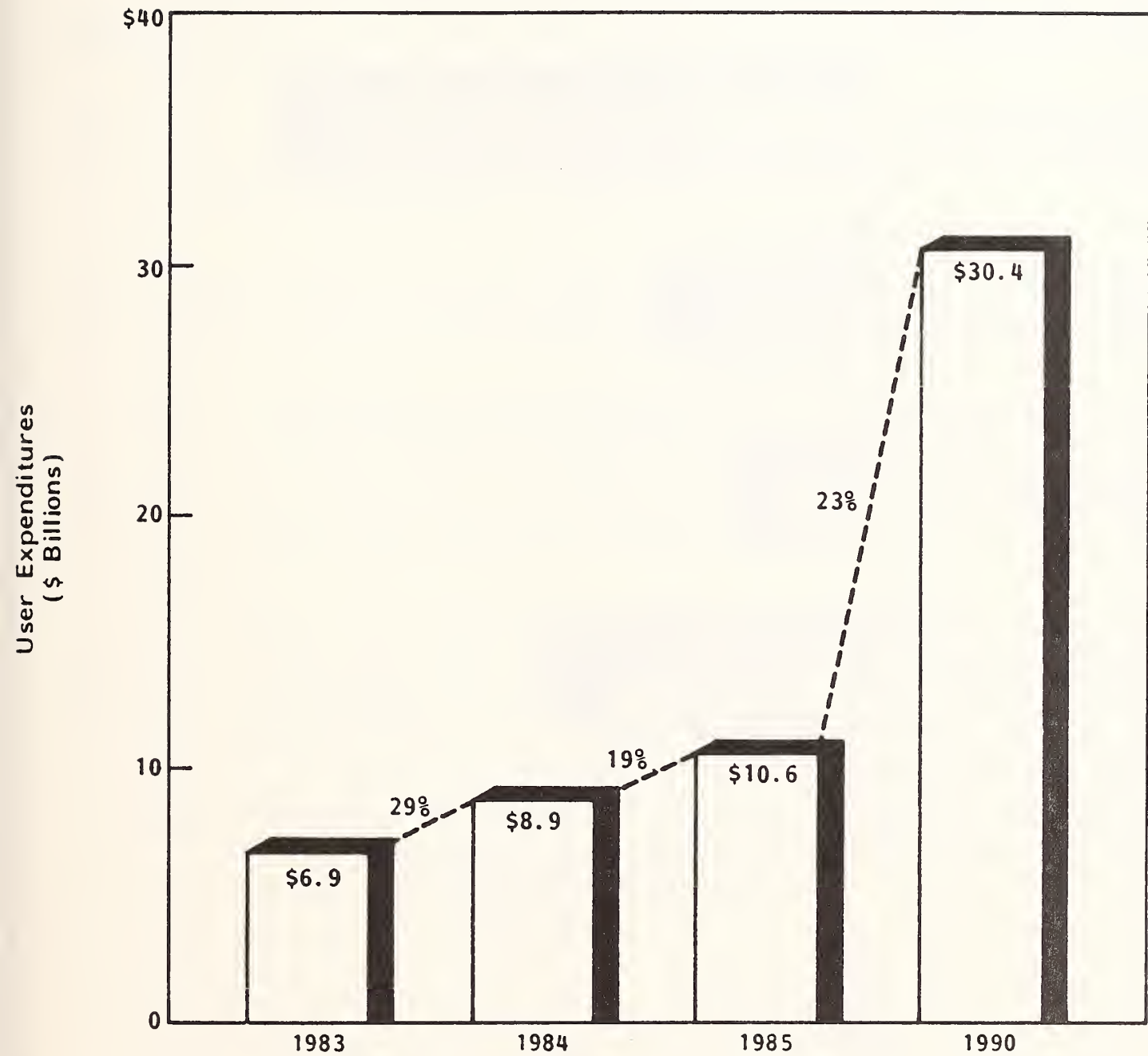
EXHIBIT III-12

MAINFRAME/MINI SOFTWARE MARKET
1985-1990

MAINFRAME/MINI SOFTWARE MARKET 1985-1990 bar chart. User Expenditures ($ Billions), X-axis 0 to 40%, with AAGR column.

Category	1985	1990	AAGR
Total Mainframe/Mini Software	$10.6	$30.4	23%
Applications Industry-Specific	$2.8	$9.8	29%
Applications Cross-Industry	$2.3	$5.1	17%
Systems Software	$5.6	$15.5	23%

User Expenditures
($ Billions)

1985
1990

- 40 -
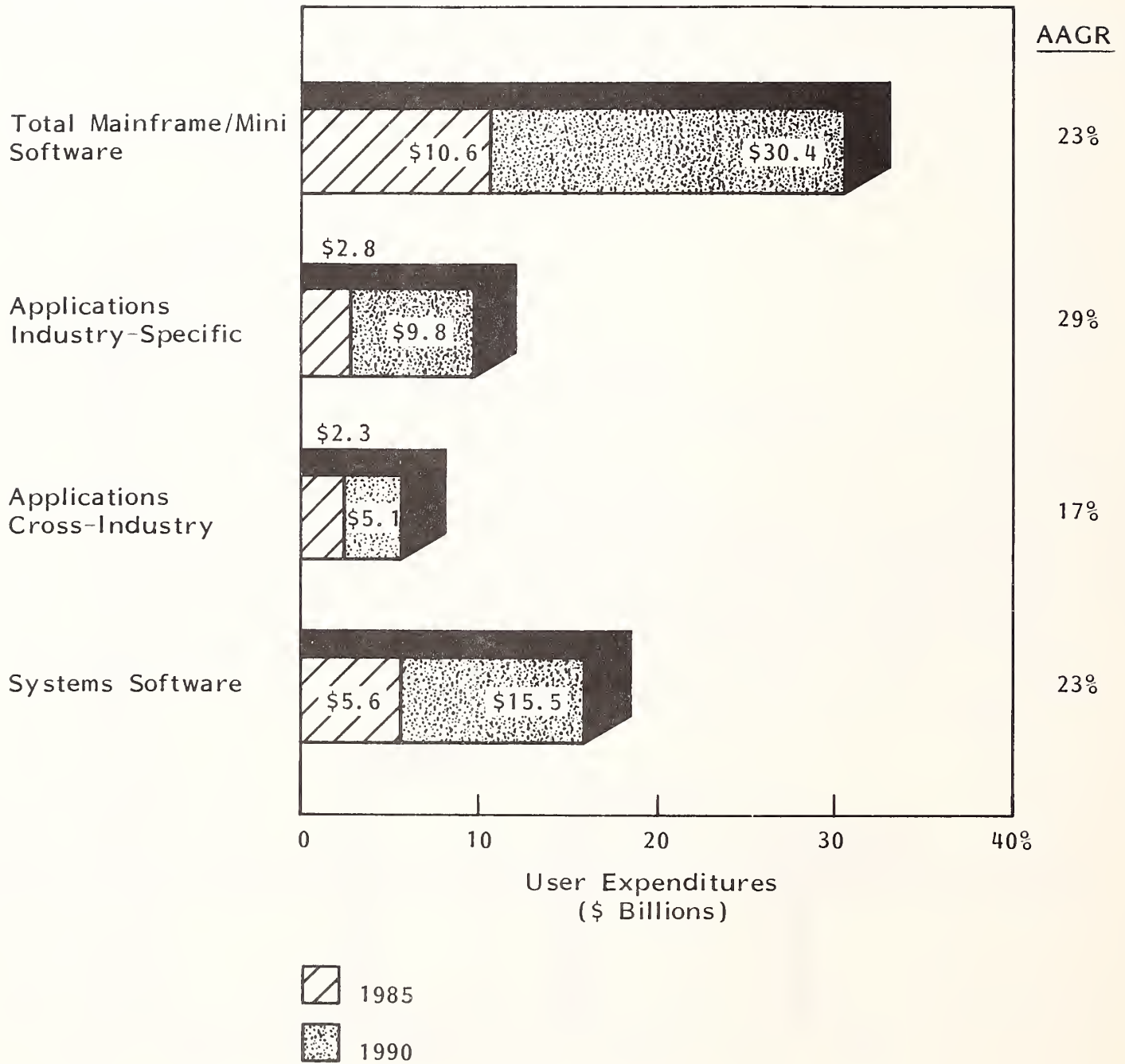
- More direct and frequent customer contact.

- Selling of solutions that are often transaction processing oriented and tend to automate the "heart of the business."

- More financial resources.

- These vendor company traits are characteristic of a consolidated, reasonably mature industry with well known, established industry leaders who have a high degree of stability.

- The leading mainframe and mini software vendors in 1984 are listed in Exhibits III-13 and III-14.

- There are three hardware vendors in the top 10 mainframe list while in the mini list hardware vendors account for the entire list of leaders.

  - This hardware vendor-skewed mini market is primarily due to the fact that these vendors provide operating systems, DBMS, and other types of systems software that have less competition from independent vendors than occurs in the mainframe market.

  - For another market perspective, Exhibit III-15 highlights independent mini leaders 1984. The top vendors, however, account for only 10% of the independent mini vendor market in 1984. This is primarily due to the fact that most applications on minis are for small businesses and are generally industry-specific in nature. Consequently, the economies of scale are not there for major hardware vendors to participate in these markets with specialized applications.

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EXHIBIT III-13

MAINFRAME SOFTWARE PRODUCT LEADERS, 1984

RANK	COMPANY	USER EXPENDITURES ($ Millions)	MARKET SHARE (Percent)
1	IBM	$1,550	30%
2	Burroughs	164	3
3	Cullinet	141	3
4	MSA	109	3
5	Sperry	101	2
6	ADR	90	2
7	Honeywell	70	1
8	Computer Associates	68	1
9	Dun & Bradstreet	63	1
10	Informatics	59	1

Total Mainframe Software Product Market = $5,200 Million

Top 10 = 47% of Market

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EXHIBIT III-14

MINI SOFTWARE PRODUCT LEADERS, 1984

RANK	USER COMPANY	USER EXPENDITURES ($ Millions)	MARKET SHARE (Percent)
1	IBM	$615	17%
2	Hewlett-Packard	227	6
3	NCR	195	5
4	DEC	187	5
5	Wang	118	3
6	Data General	59	2
7	Tandem	50	2
8	Prime	45	1
9	AT&T	45	1
10	Sperry	27	1

Total Mini Software Product Market = $3,700 Million

Top 10 = 43% of Market

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EXHIBIT III-15

MINI INDEPENDENT SOFTWARE PRODUCT LEADERS (NON-HARDWARE), 1984

RANK	COMPANY	USER EXPENDITURES ($ Millions)	MARKET SHARE (Percent)
1	Applied Communications	$18	1%
2	Cognos	16	1
3	Medical Infomation Technology	15	1
4	AGS	14	1
5	Informatics	11	1
6	Synercom	11	1
7	PDSI	10	1
8	Science Management	10	1
9	McDonnell Douglas	9	1
10	GMP Systems	7.5	1
10	Henco	7.5	1

Total Mini Independent Software Product Market = $2,100 Million

Top 10 = 10% of Market

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(ii)   Micro

   (a)   Hardware

- As previously mentioned, micro hardware is the fundamental driving force of the software industry since it increases the base of potential users.

- In 1990, there is expected to be more than 40% penetration of the potential business users.   Consequently, there were 42 million possible computer purchasers in 1985.   This number of potential purchasers will increase to 46 million in 1990, meaning that microcomputer growth opportunities will continue into the next decade.

- The average microcomputer in 1985 costs about $3,000 fully configured. In 1990, INPUT expects a system to cost about the same or slightly less except that it will come standard with more functionality. Included in a typical 1990 system will be a high-resolution color monitor, optical disk, more expensive 80386 or such microprocessor, etc. (see Exhibit III-16).

- Despite the sorry state of vendor earnings in 1985, the overall picture of micro hardware as it affects software sales (installed boxes) is good. All major vendors had increased hardware shipments in 1985.

   - IBM sales were up about 20%.

   - Compaq sales were up about 50%.

   - AT&T sales were up over 100%.

   - Apple sales were up 27% for fiscal year ending September 1985.

   - Zenith sales were up significantly.

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EXHIBIT III-16

CHANGE IN MICROCOMPUTER CONFIGURATION

PRODUCT TYPE	1985	1986-1987	1988-1990
PC,PC Compatible			
Processor	8/16	16/16	16/16
OS	PC-DOS	PC-DOS	Concurrent PC-DOS with Operating Environment
Memory	256K	512K	512K
Storage	2-5¼" Floppies	2-3½" Floppies	2-3½" Floppies
Price	$2,000	$1,500	$1,000
Monitor/Graphics	Black and White Monitor	Same	Bit Mapped Graphics
PC-XT Compatible			
Processor	8/16	16/16	16/16
OS	PC-DOS	Concurrent PC-DOS	Concurrent PC-DOS with Operating Environment
Memory	256K	512K	640K
Storage	10MB Hard Drive	20MB Hard Drive	Optical Disk
Price	$3,500	$3,000	$2,500
Monitor/Graphics	Black and White Monitor	Same	Bit Mapped Graphics

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EXHIBIT III-16 (Cont.)

CHANGE IN MICROCOMPUTER CONFIGURATION

PRODUCT TYPE	1985	1986-1987	1988-1990
PC-AT Compatibles			
Processor	16/24	16/24	16/24
OS	PC-DOS 3.1	Topview with Concurrent PC-DOS	Topview with Concurrent PC-DOS plus VM AS Host
Memory	512K	640	1 MB
Storage	20MB Hard Drive	40MB Hard Drive	(Huge) Optical Read/ Write Drive
Price	$5,500	$5,000	$3,500
Monitor/Graphics	Black-White Monitor	Same	Color Monitor
Comments:	Multiuser Capability, 3 Users	Multiuser Capability Support More than 3 Users	Multiuser Capability Support More than 3 Users
32-bit (High End)			
Processor		32/32	
OS		Concurrent PC-DOS, Topview VM	
Memory		IMB	
Storage		Optical Drive	
Price		$7,000	
Monitor/Graphics			
Comments:		- Multiuser - Multitasking 10 Users - Integrated Software Built-in - Communication	- Multiuser - Multitasking (20 Users) - Integrated Software Built-in - Communication

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EXHIBIT III-16 (Cont.)

CHANGE IN MICROCOMPUTER CONFIGURATION

PRODUCT TYPE	1985	1986-1987	1988-1990
Low End Mac (Apple, Amiga, Atari)			
Processor	16/32	16/32	16/32
OS	Proprietary	Proprietary	Proprietary
Memory	128	512K	512K
Storage	1 Floppy Drive	10 MB Hard Drive	20 MB Hard Drive
Price	$2,000	$1,000-1,500	$1,000
Monitor/Graphics		Color Monitor	Color Monitor
Comments:			Built-in Integrated Software
Hi-End MAC and Imitators			
Processor	16/32	16/32	32/32
OS	Proprietary	Proprietary	Proprietary also Runs PC-DOS
Memory	512K	640K	1 MB
Storage	2 Drives	20 MB Hard Drive	Optical Storage
Price	$3,000	$3,000	$3,000
Monitor/Graphics		Color Monitor	
Comments:		– Multiuser – Multitasking – Built-in Integrated Software	– Multiuser – Multitasking – Built-in Integrated Software

Continued

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EXHIBIT III-16 (Cont.)

CHANGE IN MICROCOMPUTER CONFIGURATION

PRODUCT TYPE	1985	1986-1987	1988-1990
LAP TOP			
Processor	8/8 or 8/16	8/16	16/16
OS	Proprietary or MS-DOS IBM Compatible	MS-DOS Compatible	MS-DOS Compatible with Operating Environment
Memory	64K	128K	256K or Bubble Memory with ROM Expander
Storage	1-3½" Disk or None	2-3½" Disk	2-3½" Disk
Price	$2,500	$2,500	$1,500
Monitor/Graphics	16 Line LCD	24 Line LCD Graphics Electroluminescent Screen	24 Line LCD Graphics Electroluminescent Screen
Comments:	Built in Software Memo Calendar Basic	Plus Built-in Integrated Software	Plus Software on Pop-out ROM Chips

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(b)   Software

- In 1984, over $2 billion was spent on micro software of all types. That averages out to about $300 per installed CPU. In 1990, almost $11 billion is expected to be spent on software or about $500 per CPU. Higher software expenditures per CPU is expected in spite of decreasing software prices since:

    - More complex software will be purchased for LANs and distributed data processing (DDP) environments at a higher price.

    - More sophisticated users will be willing to purchase a larger number of packages per system.

- In 1983-1984, user expenditure software growth was 120%. For 1984-1985, this growth decreased to 23% (see Exhibit III-17). There is still a 23% growth which is considered healthy in most industries (and is about the same growth rate as mainframe/mini software). Due to an AAGR of 32% by 1990, the annual expenditure for software will be four times larger than 1985 in spite of the fact that the hardware base will only double.

- Exhibit III-18 divides the micro software market into its major segments. The five-year AAGR of these segments varies greatly, and each will be discussed in depth in the following sections.

- From a software company perspective, in 1984 companies with revenue over $10 million accounted for about 70% of the $2.2 billion market. Viewed from another perspective, the top 10 micro software vendors accounted for over 60% of the 1984 market (see Exhibit III-19).

    - This highlights the consolidation in the industry resulting in fewer leading vendors and more difficulty for new companies to break into the markets of these existing leaders.

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INF

EXHIBIT III-17

MICROCOMPUTER
SOFTWARE EXPENDITURES
U.S. BUSINESS
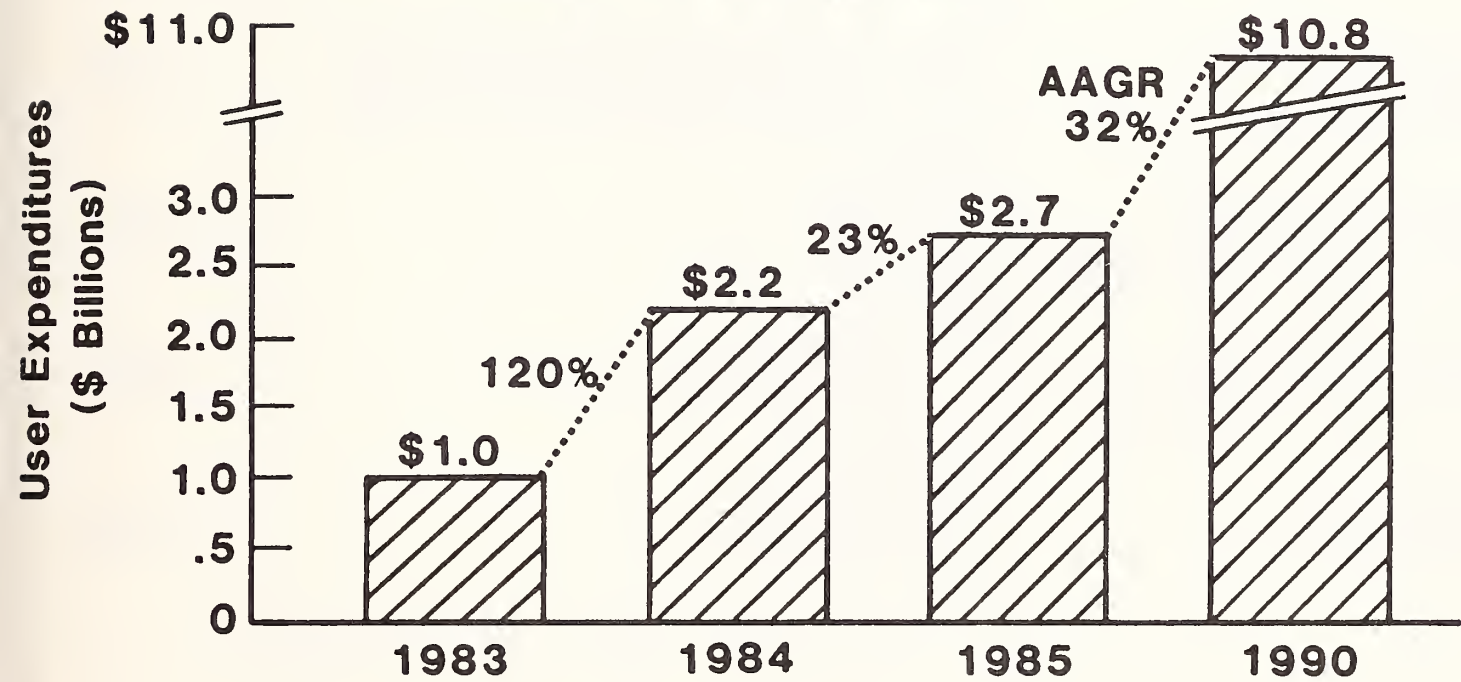
EXHIBIT III-18

STRONG MICRO SOFTWARE MARKET
1985-1990

	AAGR
Total Micro Software	32%
Applications Industry-Specific	45%
Applications Cross-Industry	20%
Systems Software	40%

Total Micro Software: $2.7 (1985), $10.8 (1990)
Applications Industry-Specific: $0.5 (1985), $3.0 (1990)
Applications Cross-Industry: $1.5 (1985), $3.7 (1990)
Systems Software: $0.8 (1985), $4.1 (1990)

User Expenditures ($ Billions)

☐ 1985   ▨ 1990
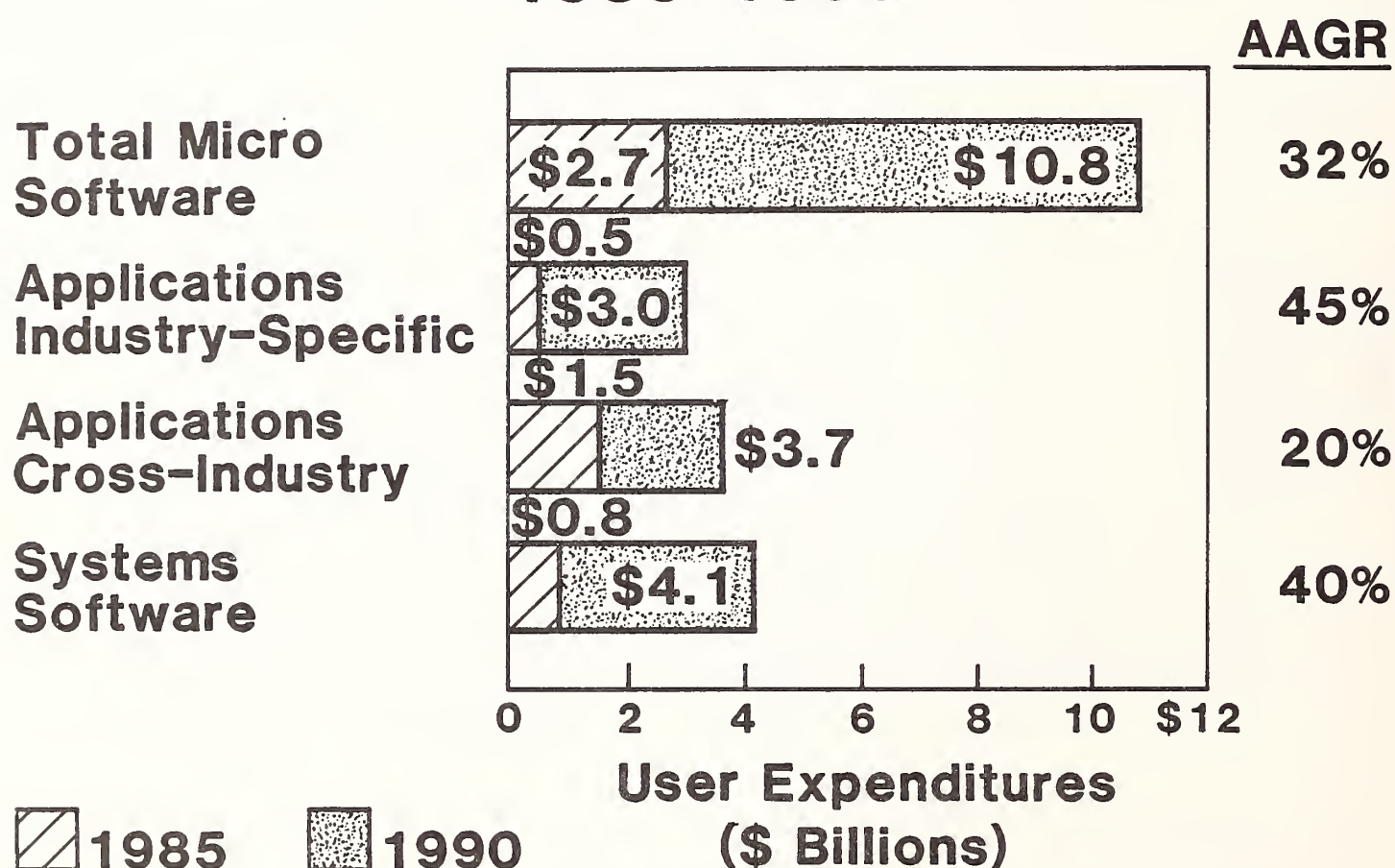
EXHIBIT III-19

MICRO SOFTWARE PRODUCT LEADERS, 1984

RANK	COMPANY	USER EXPENDITURES* ($ Millions)	MARKET SHARE (Percent)
1	Lotus	$280	13%
2	Microsoft	246	11
3	IBM	170	8
4	Ashton-Tate	128	6
5	Tandy	110	5
6	Apple	80	4
7	MicroPro	74	3
8	DRI	64	3
9	Software Publishing	46	2
10	Multimate	40	2

Total Micro Software Product Market = $2,200 Million

Top 10 = 57% of Market

* Includes distribution revenue; see page 2

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- Many smaller vendors will choose to sell the rights to their products to larger vendors rather than fight.

2. SYSTEMS SOFTWARE

 a. <u>Market in General</u>

- As shown in Exhibit III-20, systems software is used to control computers, manage data centers and networks, and develop applications.

- There have been and will continue to be definitional problems in the systems software area as the functional boundaries and capabilities of information systems continue to change. For example, as integrated applications (i.e., a combination of DBMSs and associated application(s)) become increasingly important, identifying technical and market boundaries will become more difficult. Currently, INPUT classifies spreadsheet-graphics-word processing-DBMS types of systems (e.g., Symphony and Framework) as cross-industry applications software within the planning and analysis market segment since this is the primary use of this type of system.

- The systems software market continues to experience strong growth. In 1984, over $5 billion was spent on systems software. With an expected 25% AAGR for 1985-1990, almost $20 billion will be spent in 1990 (see Exhibit III-21). In 1984, systems software accounted for 48% of the overall software market; in 1990, this segment is expected to be about the same percentage, thus reflecting the equilibrium in demand for both "solutions" (applications software) and tool and aids which support these solutions (systems software).

- Of the more than $6 billion in user expenditures in 1985 for systems software, approximately 57% was for mainframe packages, 31% for mini packages, and 12% for micro packages. The higher percentage of dollars for mini and mainframe packages is not surprisng in that products for these systems have a higher average unit price and systems software products have been available on these systems for a longer time than for micros.

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EXHIBIT III-20

SYSTEMS SOFTWARE PRODUCTS
MARKET STRUCTURE


```
                        ┌─────────────────────┐
                        │  Systems Software   │
                        └─────────────────────┘
```

Systems Control

- Access Control
- Communications Monitors
- Micro-Mainframe Links
- Network Control
- Operating Systems
- Security Systems
- System Library Control
- Windowing Systems
- Other

Data Center Management

- Capacity Management
- Computer Operations Scheduling
- Data Center Management
- Disk Management
- Downtime/Repair Monitoring Management
- Job Accounting
- Performance Monitors
- Tape Management
- Utilities
- Other

Applications Development Tools

Program Development and Production Tools

- Application Generators
- Assemblers
- Automatic Documentation
- Compilers
- Debugging Aids
- Languages (All Generations)
- Systems Development Control
- Retrieval Systems
- Translators
- Other

Data Base Management Systems

- Data Base Management Systems
- Data Dictionaries
- Other

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EXHIBIT III-21

SYSTEMS SOFTWARE MARKET, 1985-1990

*Average Annual Growth Rate

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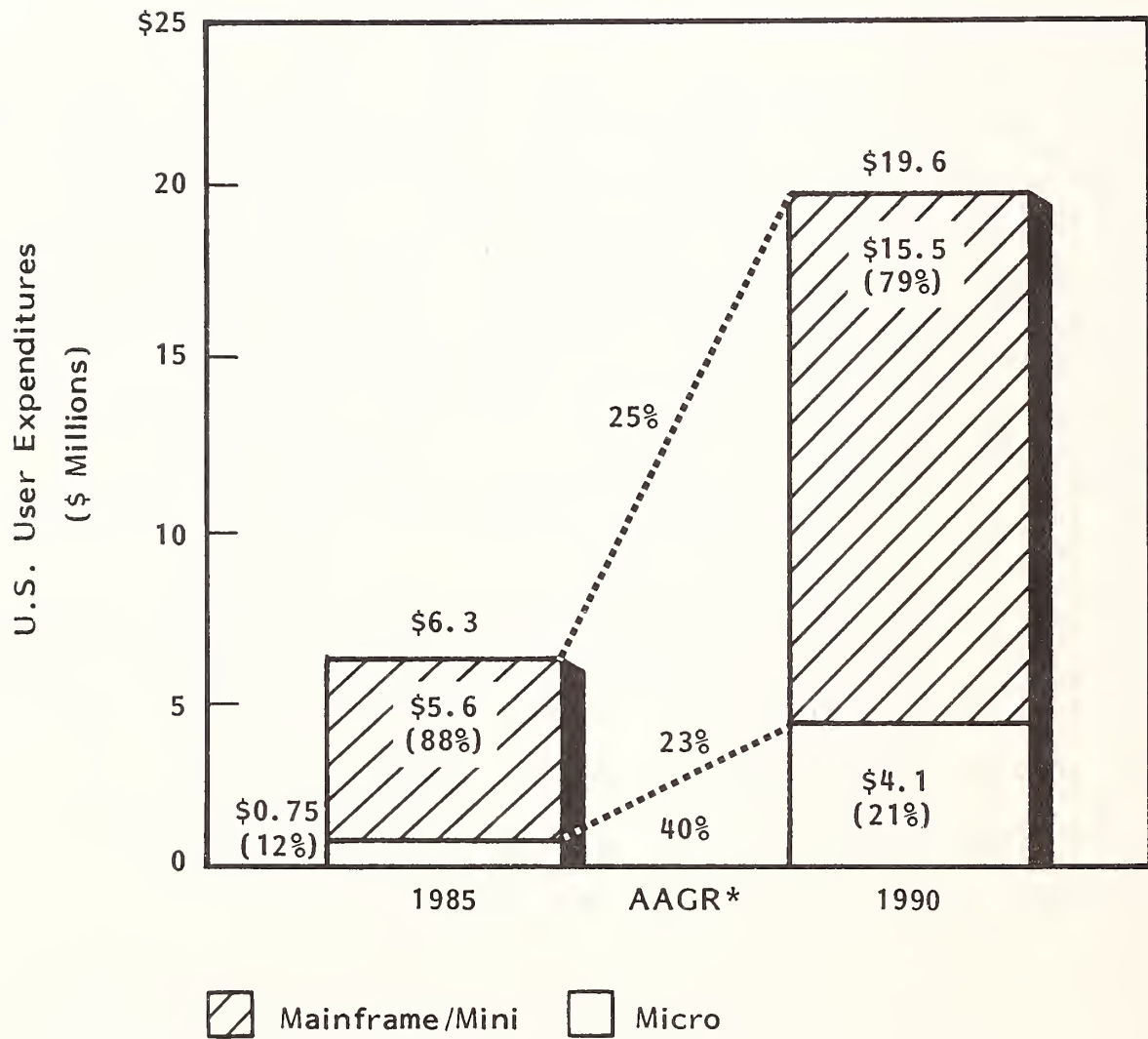
- In the systems software market in 1984, hardware vendors accounted for 47% of total user expenditure. The major segment that these vendors derive revenue from is systems control due to vendor-supplied and often proprietary operating systems.

    - Viewed from the three major hardware size categories, hardware vendors provided 45% of mainframe system software dollars, 61% of mini dollars, and only 19% of micro dollars.

    - IBM is the only major hardware vendor that provides a significant amount of micro systems software (primarily the PC-DOS operating system). Since the average revenue to IBM per system is relatively small, IBM's overall micro system software revenue, and consequently the revenue of hardware vendors as a whole in this micro segment, is relatively small.

    - Independent vendors that provide micro DBMS and languages accounted for most of the micro systems software user expenditures in 1984.

- Vendors with revenue over $10 million accounted for 72% of the overall $5 billion in 1984. Again, well-established independent as well as hardware vendors made up this percentage. Product type breakdown is as follows:

    - Vendors with revenue over $10 million accounted for 73% of mainframe systems software user expenditures.

    - Vendors with revenue over $10 million accounted for 66% of mini systems software user expenditures.

    - Vendors with revenue over $10 million accounted for 85% of micro systems software user expenditures.

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- Leading systems software vendors and their market share for 1984 are listed in Exhibit III-22. Since IBM has such an overwhelming percentage of the market, Exhibit III-23 is provided listing the top 10 independent (non-hardware) systems software vendors and market share. Of the top 50 independent software vendors in 1984, 24 of the 50 received the majority of their revenue from systems software. The fact that in 1983 only 18 of the top 50 were categorized as systems software vendors is a further reflection of viability of the systems software marketplace in spite of the abundance of applications solutions that are "ready to go."

- Exhibits III-24, III-25, and III-26 provide the top 10 vendors and market shares by system type. In all but micro systems software, IBM is the leader by a wide margin. In micro software, however, IBM has as yet not been as aggressive as in other markets. Thus, several independent vendors have gained significant market dominance. In the mini segment, the top 10 vendors are all hardware manufacturers but one (Cognos), since most mini vendors provide their own proprietary operating systems as well as "office solutions" such as DBMS, tools, and connectivity. The mini applications software market in comparison is dominated by independent vendors, mostly VARs or small private companies.

b.   Forecasts

- As previously mentioned, the systems software market is expected to grow well during the forecast period.

    - The mainframe/mini segment, which accounts for 88% of user expenditures in 1984 but will decrease in market percentage to 79% in 1990, will have an AAGR of 23% (see Exhibit III-27).

    - With the growth of micros and their increasing usefulness as productivity tools, rapid systems software expansion will occur. Starting from a much smaller base than systems software products for larger

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EXHIBIT III-22

SYSTEMS SOFTWARE PRODUCT LEADERS, 1984

RANK	COMPANY	USER EXPENDITURES ($ Millions)	MARKET SHARE (Percent)
1	IBM	$1,624	30%
2	DEC	189	4
3	Microsoft*	172	3
4	Cullinet	131	2
5	Hewlett-Packard	122	2
6	Burroughs	108	2
7	NCR	100	2
8	Sperry	98	1
9	Ashton-Tate*	96	1
10	ADR	85	1

Total Systems Software Product Market = $5,300 Million

Top 10 = 48% of Market

* Includes distribution revenue; see page 2

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EXHIBIT III-23

SYSTEMS SOFTWARE PRODUCT LEADERS (NON-HARDWARE), 1984

RANK	COMPANY	USER EXPENDITURES ($ Millions)	MARKET SHARE (Percent)
1	Microsoft*	$172	6%
2	Cullinet	131	5
3	Ashton-Tate*	96	3
4	ADR	85	3
5	Computer Associates	67	2
6	Informatics	58	2
7	Cincom	50	2
8	Pansophic	45	2
9	Candle	40	1
10	Information Building	38	1

Total System Software Product Independent Market = $2,800 Million

Top 10 = 27% of Market

* Includes distribution revenue; see page 2

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EXHIBIT III-24

MAINFRAME SYSTEMS SOFTWARE PRODUCT LEADERS, 1984

RANK	USER COMPANY	USER EXPENDITURES ($ Millions)	MARKET SHARE (Percent)
1	IBM	$1,100	36%
2	Cullinet	131	4
3	Burroughs	100	3
4	Sperry	87	3
5	ADR	85	3
6	Computer Associates	67	2
7	Informatics	55	2
8	Pansophic	45	1
9	Cincom	44	1
10	Candle	40	1

Total Mainframe Systems Software Product Market = $3,100 Million

Top 10 = 56% of Market

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EXHIBIT III-25

MINI SYSTEMS SOFTWARE PRODUCT LEADERS, 1984

RANK	COMPANY	USER EXPENDITURES ($ Millions)	MARKET SHARE (Percent)
1	IBM	$456	28%
2	DEC	169	10
3	Hewlett-Packard	120	7
4	NCR	90	5
5	Tandem	50	3
6	AT&T	30	2
7	Wang	29	2
8	Cognos Inc.	16	1
9	Data General	15	1
10	Prime	15	1

Total Mini Systems Software Product Market = $1,600 Million

Top 10 = 60% of Market

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EXHIBIT III-26

MICRO SYSTEMS SOFTWARE PRODUCT LEADERS, 1984

RANK	USER COMPANY	USER EXPENDITURES* ($ Millions)	MARKET SHARE (Percent)
1	Microsoft	$172	27%
2	Ashton-Tate	96	15
3	IBM	68	10
4	DRI	60	9
5	Tandy	30	5
6	Software Publishing	30	5
7	Borland	16	2
8	Information Builders	16	2
9	Micro Focus	12	2
10	AT&T	8	1

Total Micro Systems Software Product Market = $650 Million

Top 10 = 78% of Market

* Includes distribution revenue; see page 2

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EXHIBIT III-27

MAINFRAME/MINI SYSTEMS SOFTWARE*
U.S. BUSINESS
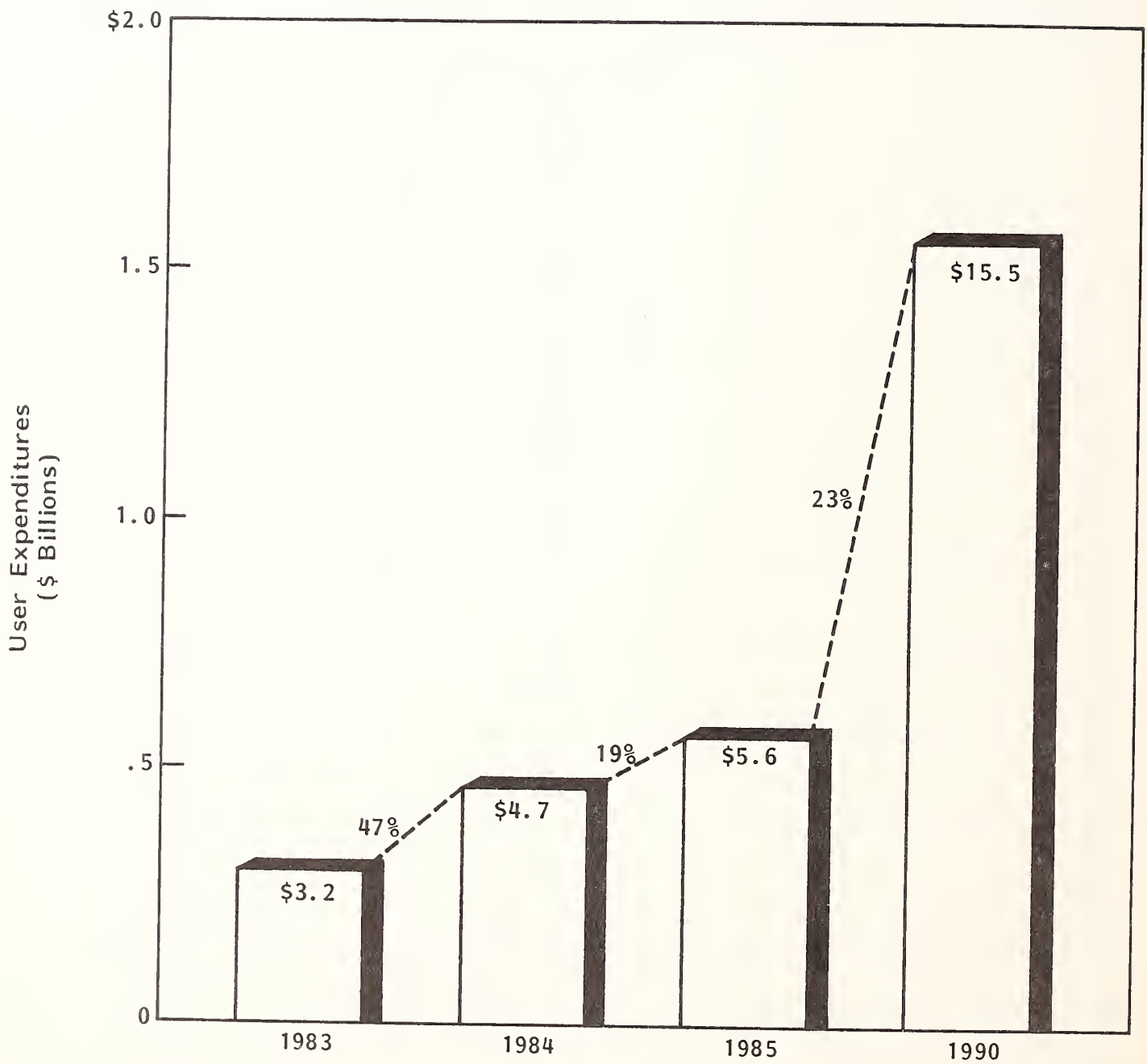
* Includes application development tables, systems control, and data center management.

systems, the micro segment will have a 42% AAGR from 1985-1990 (see Exhibit III-28).

- A major driving force that especially impacts the systems software market is the increasing trend toward incorporating systems software in applications (see Exhibit III-29). This will stimulate systems software sales and make applications packages more attractive purchases.

c.   Application Development Tools

(i)   Forecasts

- The application development tools market will have the highest 1985-1990 growth rate of all the systems software segments at 30% (see Exhibits III-30, III-31, and III-32). The micro portion of the market will grow from 14% in 1984 to 23% in 1990. This will be due to a large increase in micro DBMS sales as well as many successful mainframe packages that will have equivalent full function micro packages--especially fourth generation languages--for both programmers and end users. An example of this is PC Focus by Information Builders.

- End-user computing demand will be the major growth stimulus for this market. End users will increasingly demand more and more tools to access information or create systems. They will realize that many off-the-shelf applications packages will not satisfy their specific needs and will resort to fourth generation languages either on host or micros to build or rework programs. Retrieval tools will also be easier to use and be more accessable to non-programmers.

(ii)   DBMS

- A DBMS is becoming fundamental to almost every application area that exists today; consequently, the overall growth of the DBMS market will continue.

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EXHIBIT III-28

MICROCOMPUTER SYSTEMS SOFTWARE*
U.S. BUSINESS
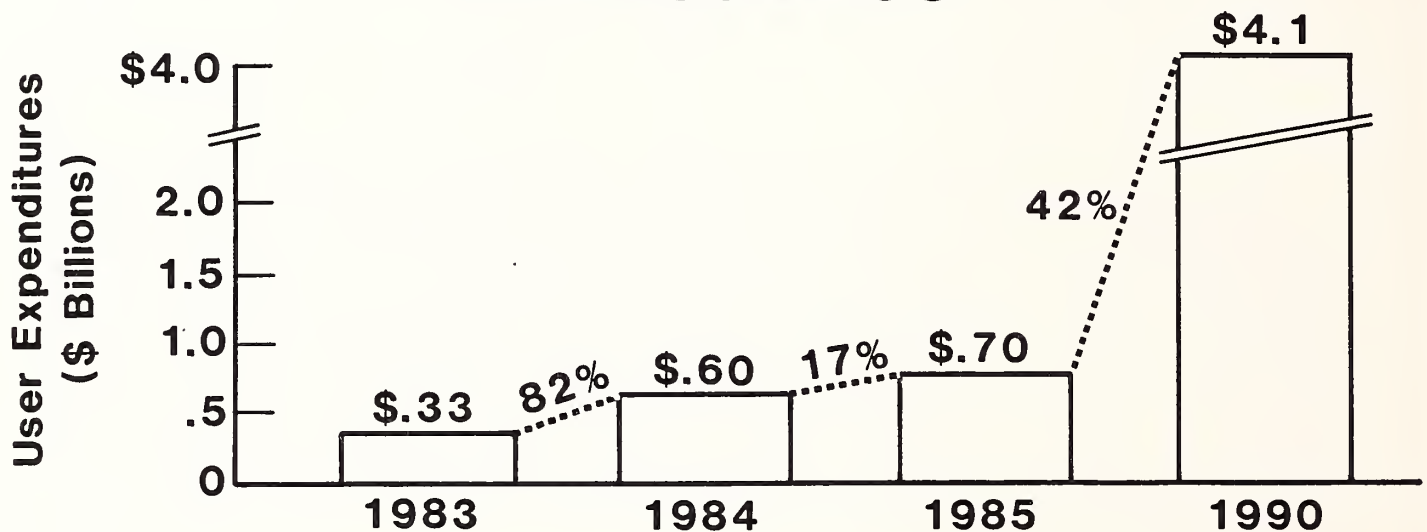
*Includes: Application Development Tools

Systems Control

Data Center Management

EXHIBIT III-29

INPUT®

APPLICATIONS SOFTWARE COMPONENT EVOLUTION

1980 — Core Features — TP RW — **Data**
95% — 5%

1985 — Core Features — TP, RW FGL DBMS M-M — **Information**
90% — 10%

1990 — Core Features — TP FGL DBMS M-M AI — **Knowledge**
50% — 50%
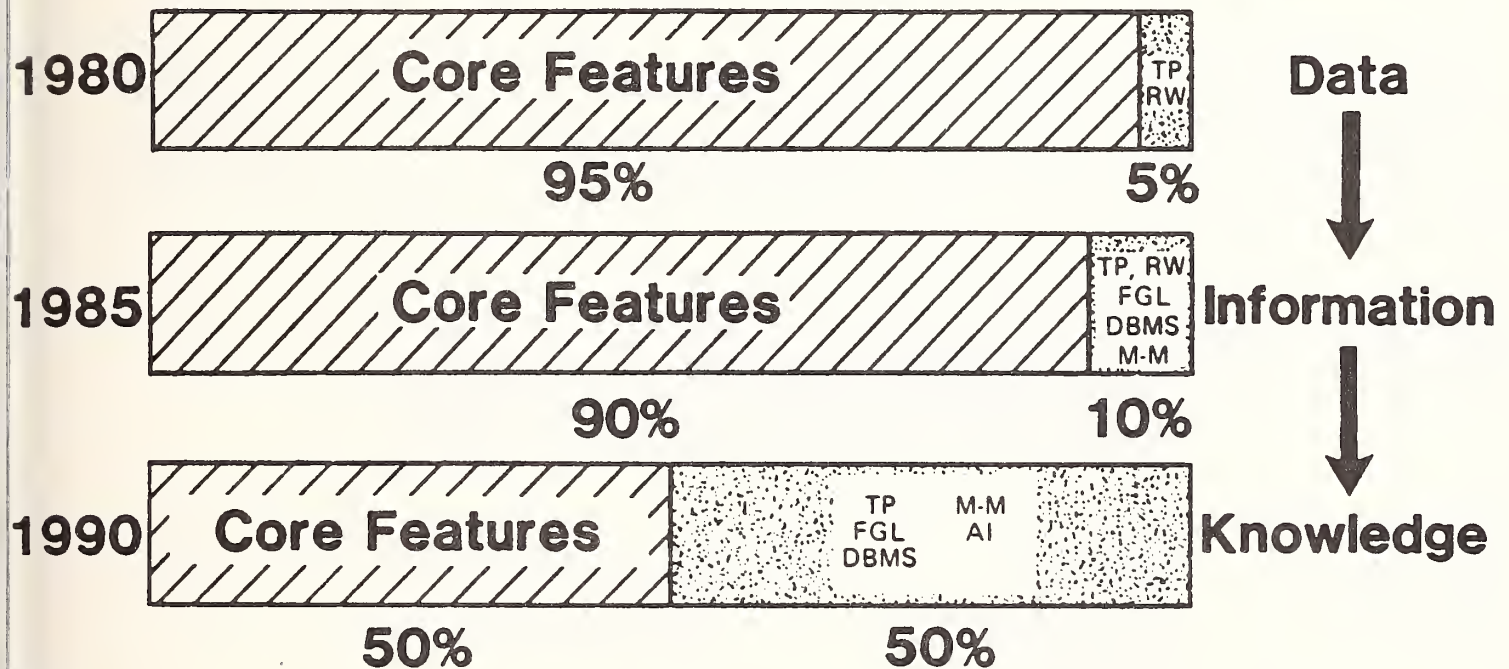
▨ = Systems Software (Tools and Aids)

(TP = Teleprocessing, RW = Report Writing, FGL = Fourth-Generation Language,
DBMS = Data Base Management System, M-M = Micro-Mainframe Communication,
AI = Artificial Intelligence)

Percent = User Perceived Value

EXHIBIT III-30

TOTAL SYSTEMS SOFTWARE MARKET
BY SOFTWARE TYPE, 1985-1990
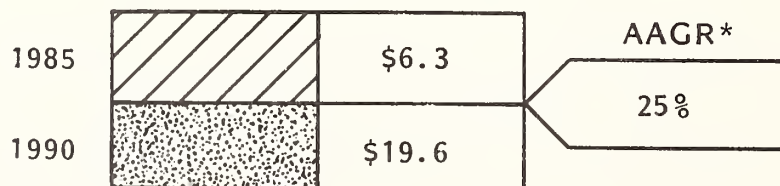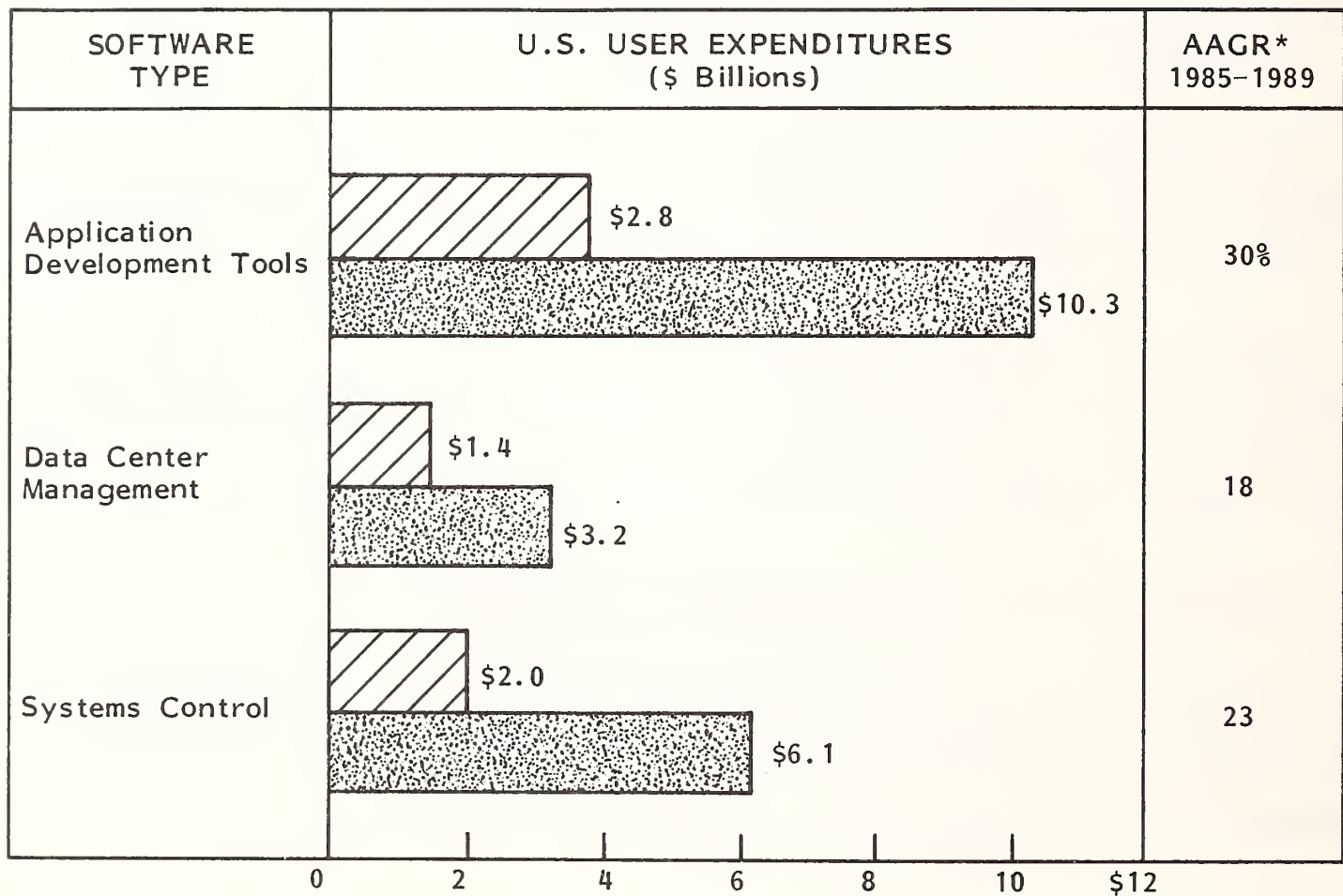
SOFTWARE TYPE	U.S. USER EXPENDITURES ($ Billions)	AAGR* 1985-1989
Application Development Tools	$2.8 / $10.3	30%
Data Center Management	$1.4 / $3.2	18
Systems Control	$2.0 / $6.1	23

0   2   4   6   8   10 $12

		AAGR*
1985	$6.3	25%
1990	$19.6	

* Average Annual Growth Rate

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EXHIBIT III-31

MAINFRAME/MINI SYSTEMS SOFTWARE MARKET
BY SOFTWARE TYPE, 1985-1990

SOFTWARE TYPE	U.S. USER EXPENDITURES ($ Billions)	AAGR* 1985-1989
Application Development Tools	$2.4 / $7.9	27%
Data Center Management	$1.4 / $3.0	17
Systems Control	$1.8 / $4.6	21

		AAGR*
1985	$5.6	23%
1990	$15.5	

* Average Annual Growth Rate

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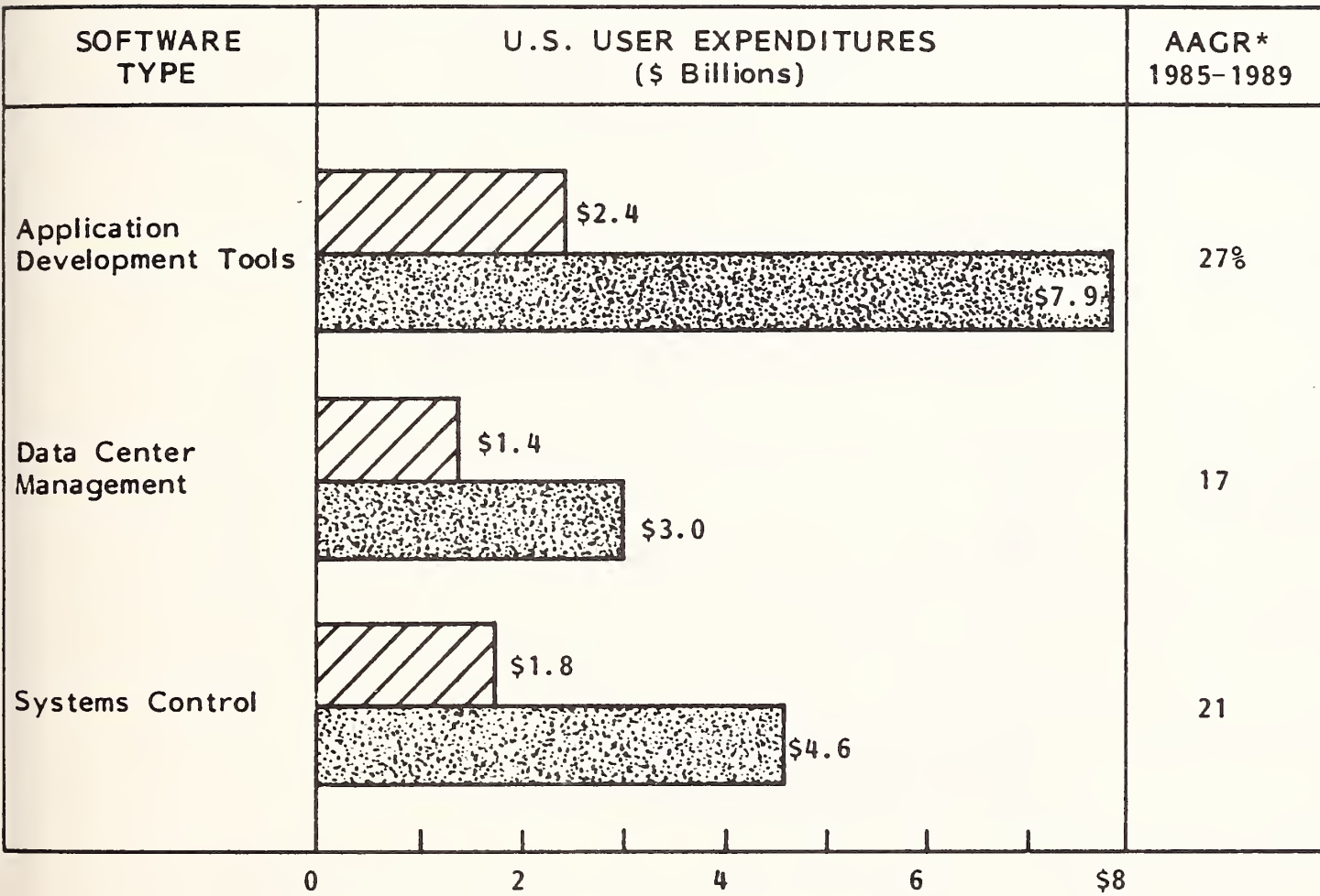
EXHIBIT III-32

MICRO SYSTEMS SOFTWARE MARKET
BY SOFTWARE TYPE, 1985-1990

SOFTWARE TYPE	U.S. USER EXPENDITURES ($ Billions)	AAGR* 1985-1989
Application Development Tools	$0.4 / $2.4	43%
Data Center Management	$0.01 / $0.2	74
Systems Control	$0.3 / $1.5	35

0   1.0   2.0 $3.0

		AAGR*
1985	$.750	40%
1990	$4.1	

* Average Annual Growth Rate

- 70 -
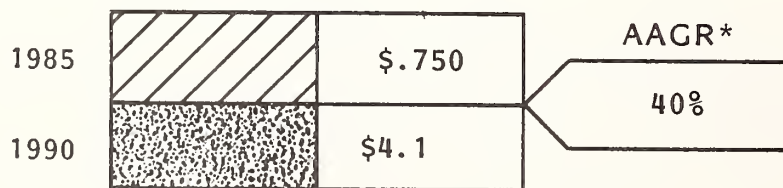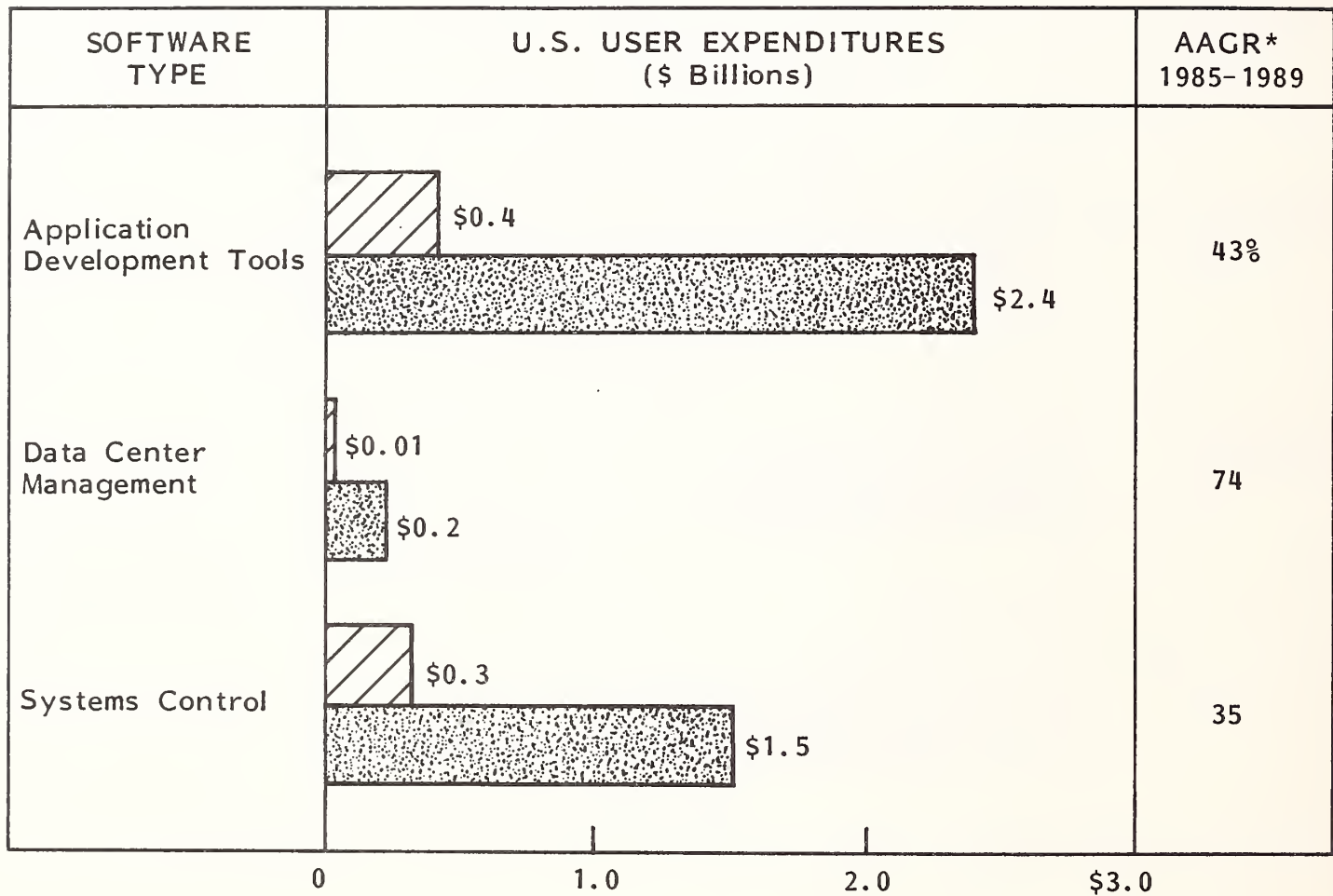
- IBM's DB2 is already increasing in user acceptance, and there is an increased acceptance overall of relational data bases with improved performance; i.e., speed such as that found in ADR's product.

- Natural language interfaces are making it easier to query both mainframe/mini as well as micro DBMS products.

- INPUT projects that IBM's primary emphasis for the remainder of the 1980s (or IBM's SNA/DDP strategic period) will be on the following:

  - Continued emphasis upon highly centralized host control through SNA, operating systems, and DBMS.

  - Control of distributed processing and data bases.

- IBM impact on the mainframe DBMS marketplace is expected to be significant (see Exhibit III-33).

- While DBMS revenues will still represent only a small percentage of IBM's total revenue, INPUT believes DBMS will be the key to IBM's account control and to its all-important mainframe and magnetic storage sales.

  (iii)   Penetration Analysis

- From a penetration analysis perspective, the applications development tools market growth again is impressive. Mainframe/mini analysis is presented in Exhibit III-34.

  - In 1984, $1,400 was spent per mainframe/mini CPU with over double that expected to be spent in 1990. This highlights the increasing number of tools that will be in use for programmers as well as for end users.

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EXHIBIT III-33

DBMS: KEY TO IBM CONTROL & GROWTH?

MARKET	$ Billions	
	1984	1990
• Total IBM Revenue	$46.0	$100.0
– IBM Software Revenue	2.4	18.0
• Total DBMS Market	1.0	6.4
– IBM DBMS Share	.6	3.6
– Non-IBM DBMS Share	.4	2.8

EXHIBIT III-34

APPLICATION DEVELOPMENT TOOLS
PENETRATION ANALYSIS: MAINFRAMES/MINIS
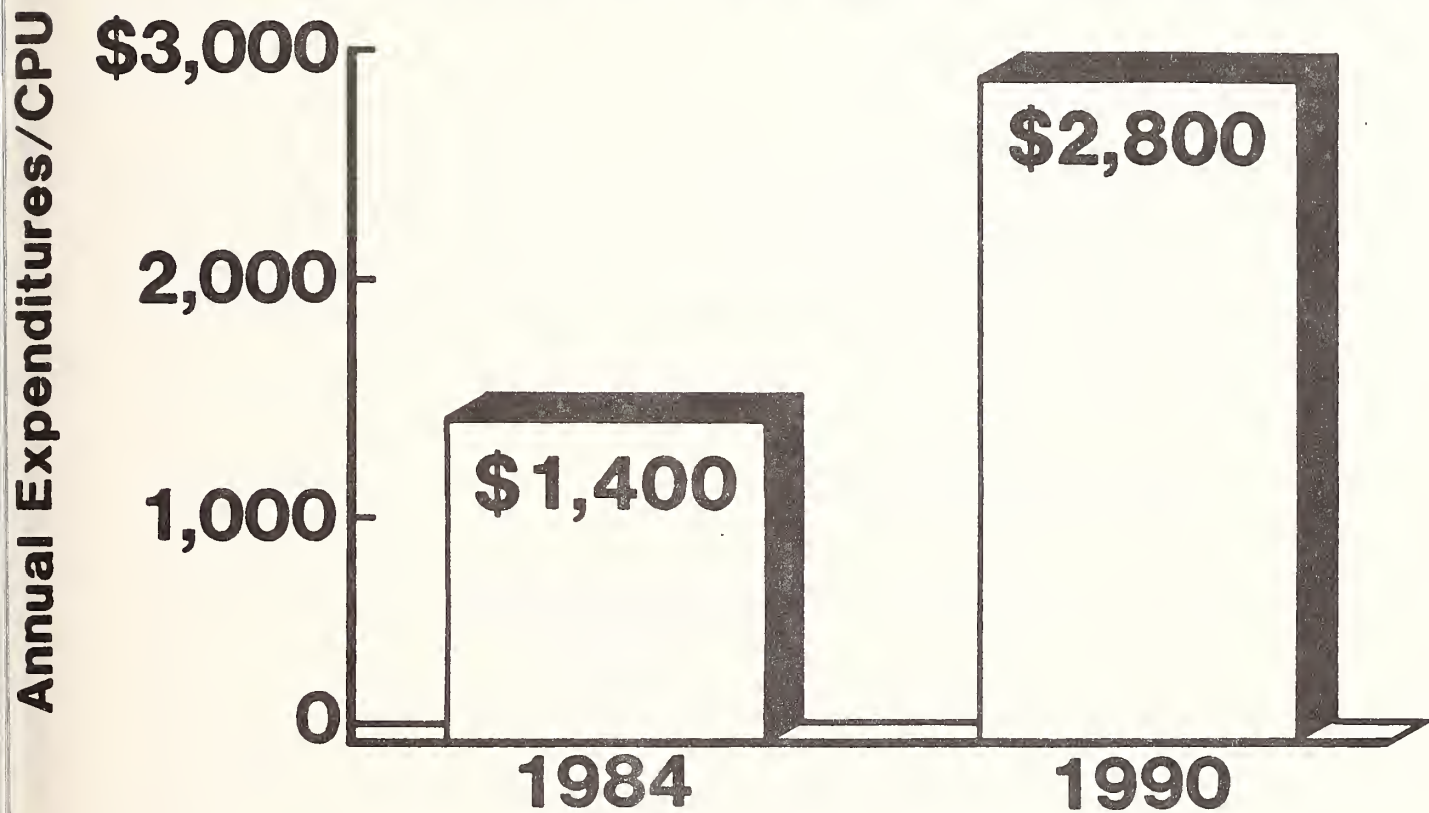
- From 1984 to 1990, the installed base of micros is expected to double. During the same timeframe the number of dollars spent per CPU on micro applications development tools is expected to quadruple (see Exhibit III-35). In spite of this large increase in CPU/dollar comparison, it should be noted that the mainframe/mini market for application development tools in 1990 will be twice as large dollarwise as the micro market.

    (iv)   Leading Vendors

- In spite of the fact that from a market share perspective, IBM has the market lead in the applications development tools segment, several large independents also have significant market share. This is due to strong DBMS product sales primarily in the mainframe market by leading independent vendors (see Exhibit III-36).

    d.   Data Center Management

- There are two broad types of data center management software products:

    - Products that optimize a machine's internal resources.

    - Products that help increase the productivity of the entire computer center.

- The data center management segment is expected to more than double within the forecast period (see Exhibit III-30, III-31, and III-32).

    - The micro segment will experience significant growth (AAGR 74%), but this is primarily due to 1985 user expenditures forming a low base.

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EXHIBIT III-35

APPLICATION DEVELOPMENT TOOLS
PENETRATION ANALYSIS: MICROS

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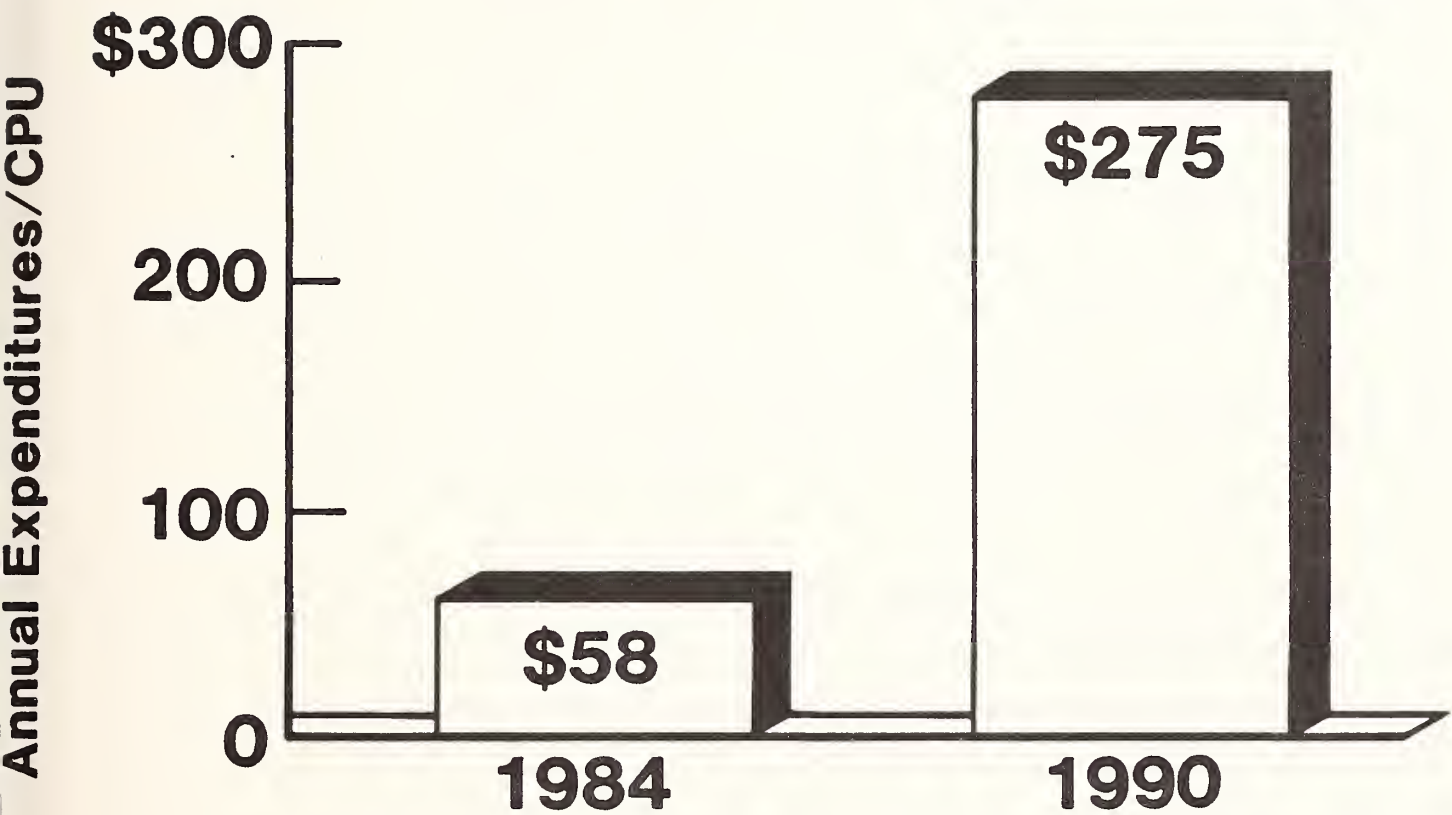
EXHIBIT III-36

APPLICATION DEVELOPMENT TOOL SOFTWARE PRODUCT LEADERS, 1984

RANK	COMPANY	USER EXPENDITURES ($ Millions)	MARKET SHARE (Percent)
1	IBM	$672	29%
2	Cullinet	131	6
3	Ashton-Tate*	96	4
4	Microsoft*	68	3
5	ADR	64	3
6	Informatics	49	2
7	Cincom	45	2
8	Burroughs	43	2
9	NCR	40	2
10	Sperry	39	2

Total Application Development Tool Software Product Market = $2,300 Million

Top 10 = 55% of Market

* Includes distribution revenue; see page 2

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- Ninety-four percent of user expenditures for data center management will be mainframe/mini product related, the balance (6%) micro related.

- As micros become more complex and interconnect, firms will require additional overhead of software, services, and people to coordinate their use. This will help fuel data center management growth.

- Micros now costing $3,000 in many cases will be replaced within the forecast period by more sophisticated, multiuser systems (more than $10,000) driving terminals.

  - Consequently, management of these computing resources will become an issue. Individual departments within a corporation will become "mini" DP departments.

  - As LANs increase in importance, keeping track of files, scheduling, and backup will all become major issues that data center management products address.

- From a vendor perspective, most major independent vendors will retain or increase market share due to quality products and name recognition (see Exhibit III-37 for 1984 market share). There will, however, be a need for products that run on micros (in this market there are no entrenched leaders) creating opportunities for vendors of products for larger systems as well as for lesser known vendors.

  e. Systems Control

    (i) Market in General

- In 1990, the systems control segment will account for over $6 million in user expenditures as a result of a five-year 23% AAGR. This will make the

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INPUT

EXHIBIT III-37

DATA CENTER MANAGEMENT SOFTWARE PRODUCT LEADERS, 1984

RANK	USER COMPANY	USER EXPENDITURES ($ Millions)	MARKET SHARE (Percent)
1	IBM	$270	23%
2	Computer Associates	50	4
3	Candle	40	3
4	UCCEL	35	3
5	Burroughs	22	2
6	Sperry	20	2
7	NCR	20	2
8	DEC	19	2
9	Pansophic	18	2
10	Syncsort	18	2

Total Data Center Management Software Product Market = $1,200 Million

Top 10 = 45% of Market

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systems control sector in 1990 nearly as large as the systems software market in 1985.

- In 1985, the mainframe/mini segment of this market accounted for 90% of the user expenditures (micro 10%). In 1990, the mainframe/mini share of the systems control segment is expected to decrease in percent of expenditures to 75% while the micro share increases to 25%.

- The increase in micro share can be attributed in most part to the micro shipments of systems with more functional and more expensive operating systems (see the following section on micro operating systems) as well as to the incorporation of micro-mainframe links and LANs on new and existing micros.

- Both the mainframe/mini and micro segments will, however, have healthy growth rates during the forecast period.

(ii)   Vendors

- From a 1984 vendor perspective, the top 10 vendors accounted for almost 70% of the market (see Exhibit III-38). Eight of the top 10 were hardware vendors.

- This is not surprising since the largest component of this segment is operating systems for which most hardware vendors provide their own proprietary products.

- INPUT expects this vendor segmentation to change in the coming years, however, as independent vendors provide connectivity tools as links in the overall office environment.

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EXHIBIT III-38

SYSTEMS CONTROL SOFTWARE PRODUCT LEADERS, 1984

RANK	COMPANY	USER EXPENDITURES ($ Millions)	MARKET SHARE (Percent)
1	IBM	$684	38%
2	DEC	132	7
3	Microsoft*	104	6
4	Hewlett-Packard	85	5
5	DRI*	46	3
6	Burroughs	43	2
7	NCR	40	2
8	Sperry	39	2
9	Tandem	35	2
10	AT&T	29	2

Total Systems Control Software Product Market = $1,800 Million

Top 10 = 69% of Market

* Includes distribution revenue; see page 2

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(iii)   Stimulus Factors

- Factors that serve to stimulate systems control software growth include:

    - The acceptance of connectivity in the office systems marketplace--
      through micro-mainframe links, LANs, PBX, and multiuser systems.

    - More demand for systems security to protect the data in this increas-
      ingly on-line environement.

    (iv)   Operating Systems and Micro-Mainframe Links

- The following discussion of two segments of the systems control market--
  micro operating systems and micro-mainframe links--are extractions from the
  executive summaries of two INPUT MAPs 1985 studies by the same name.
  These sections are provided to give the reader relevant market data regarding
  these volatile markets "at his/her fingertips," but in no way cover the markets
  as comprehensively as the original studies.

- In order for the applications software market to develop, an operating system
  (OS) standard must be available to serve as the foundation for families of
  software products with compatible files and command structures. Knowing
  which operating system will emerge as the dominant standard is therefore
  crucial since it conditions the ultimate success of the hardware it drives and
  the applications it supports.

- Multiuser, multitasking, shared-file, and interconnected personal processing
  are the new markets that await development, and those needs must be
  supported by high-performance operating systems that integrate all of the
  supporting functions needed by these very different components.

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- IBM's strategy:

  - IBM's decision in 1981 to enter the microcomputer industry has affected the entire small system market immensely. The company offered a microcomputer product (the IBM PC, with an 8088-8/16 bit chip) more capable than competitors' with an open operating system to encourage development by third-party vendors of a large applications software base. In 1983-1984, IBM took over the business micro-computer marketplace.

- IBM's goal is to structure the office environment around the systems network architecture (SNA) and to assure the increasing demand for mainframe MIPs. Networked microcomputers as intelligent workstations linked to mainframes are a significant part of this strategy. Consequently, an operating system for microcomputers that provides these capabilities is a mandatory step for the company to take (see Exhibit III-39).

  - INPUT believes IBM will port a version of its mainframe operating system (VM) down to the microcomputer level for its high-end PC products. This proprietary operating system will help the company achieve absolute market dominance and reinforce the dependence on SNA. INPUT believes this proprietary microcomputer operating system, targeted for general business microcomputers, could be intro-duced as early as 1986.

  - Most IBM PC/AT-type products and above are expected to have multiple operating systems running as guests under VM. This would include an enhanced version of PC-DOS (multiuser, multitasking) and perhaps a third choice, such as UNIX. The PC-DOS operating system would allow the usage of PC-DOS applications software from the large installed base. The inclusion of other operating systems would depend upon uniqueness of applications packages for that environment as well as the tools for program modification or development available under that specific operating system.

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EXHIBIT III-39

INPUT®

IBM's OFFICE SYSTEM STRATEGY DEFINES THE OPERATING SYSTEM MARKET

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MCSM MSAS
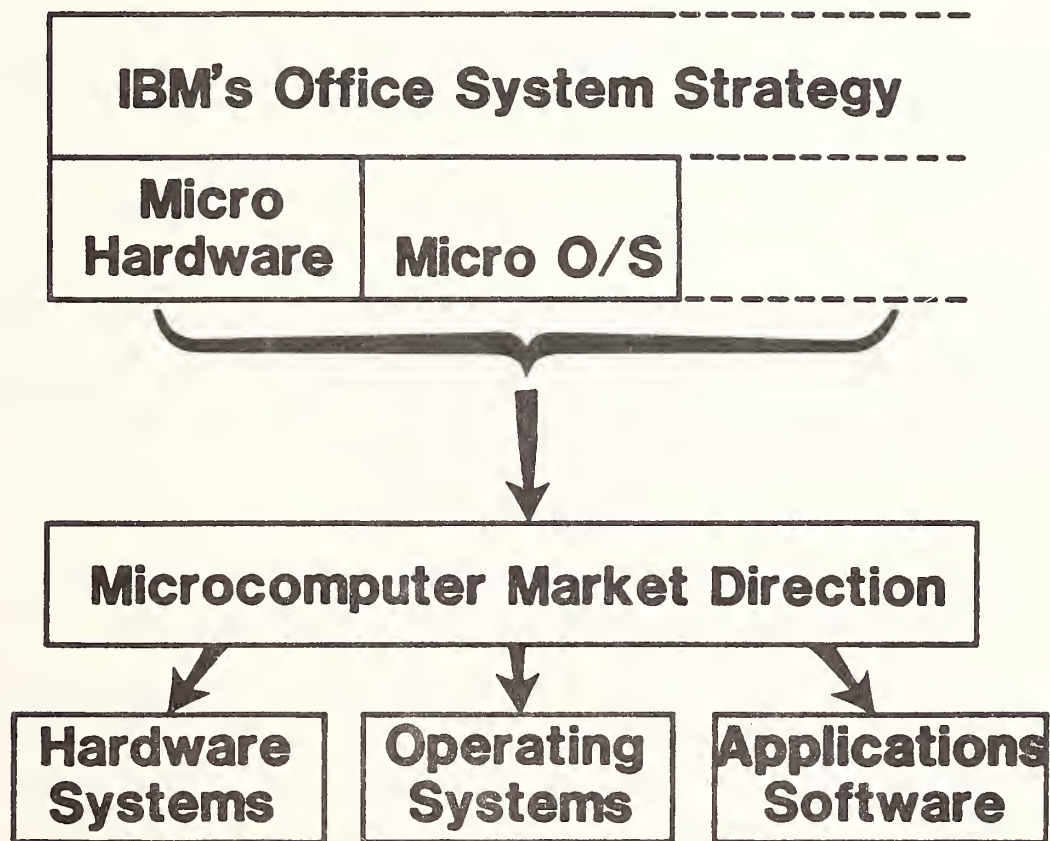
- IBM's microcomputer products, based on IBM's operating system (PC-DOS and proprietary), will continue to have healthy growth rates.

- As the decade continues, both large and small businesses will consider their computers more as necessities than as luxuries. Consequently, they will continue to turn to established companies for microcomputers--companies that can provide quality service and support and will remain in business to provide future compatible product upgrades and enhancements. The overwhelming choice for vendor will be IBM.

- Exhibit III-40 shows there will be secondary growth market opportunities for MS-DOS IBM compatibles, as well as for products based on major vendors' (i.e., Apple, Commodore) proprietary operating systems.

- Small businesses will be the main segment for these products since they are more price conscious than are large businesses, and the products will be lower in price than IBM products. "IBM consciousness" is not as well entrenched in small business as in large.

- UNIX, due primarily to AT&T marketing thrust, will become a significant operating systems market player in 1986-1987 in multiuser environments; however, its market share will decrease significantly by decade's end as UNIX's major selling points (multiuser, multitasking, programming utilities) will be incorporated in one of IBM's new operating systems. UNIX will remain a market alternative, but, as with proprietary vendors, will be more successful in small business markets than in large.

- The present micro-mainframe link marketplace is in a state of confusion, making link purchasing difficult for IS. Consequently, shipments of link products have been low; only about 150,000 micros were linked directly to mainframes in 1984 (see Exhibit III-41).

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EXHIBIT III-40

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THE FATE OF THE OPERATING SYSTEM MARKET

GROWTH MARKET	SECONDARY MARKET	DIMINISHING
PC-DOS and Upgrades	MS-DOS, IBM-Compatible OS, Proprietary OS,* UNIX/XENIX	MS-DOS, CP/M, Other Non-Proprietary O/S

*Excludes IBM

EXHIBIT III-41

MICRO-MAINFRAME LINK MARKET CONFUSION

- Lack of Standards

- Enormous Price Variance

- Products Are Complicated and
  Do Not Provide a "Total Solution"

- There is an absence of communication and operating system (OS) standards, and although the general consensus that the IBM sets the corporate standard, establishing standards takes time.

- There is also no standard micro-mainframe product. Products range from low-end terminal emulators to sophisticated high-end products. Prices range from $1,000 to $75,000, depending on the product and number of microcomputers linked.

- Most link products require IS involvement. "Packaged" links must often be customized for specific corporate data bases and applications. Nontechnical end users find that the accessing of host data is complicated and impedes user productivity.

  - INPUT believes connectivity is a very significant office trend. Seventy percent of all microcomputers in business are expected to be linked; however, micro-mainframe is only one way to provide the connectivity. Other ways include LANs, CBXs, and multiuser systems.

  - In 1984, only about 3% of the microcomputers installed in business were physically linked to in-house hosts. In 1990, about 12% are expected to be physically linked, with another 9% being linked on a more "casual" basis via modem and communications software.

  - INPUT projects that in 1990, 85% of the microcomputers in business will be used for analytical (primarily spreadsheet) type functions and 15% for operational processing tasks such as manufacturing and production. Modem links and LANs will be the connectivity methods which predominate for these analytical functions. Direct micro-mainframe linkage will probably be the connectivity method employed by operational workers (e.g., data entry, programming personnel) who need to access host data on a timely, ongoing basis (see Exhibit III-42).

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EXHIBIT III-42

INPUT®

OFFICE CONNECTIVITY

Business Microcomputer Installed Base
1984-1990
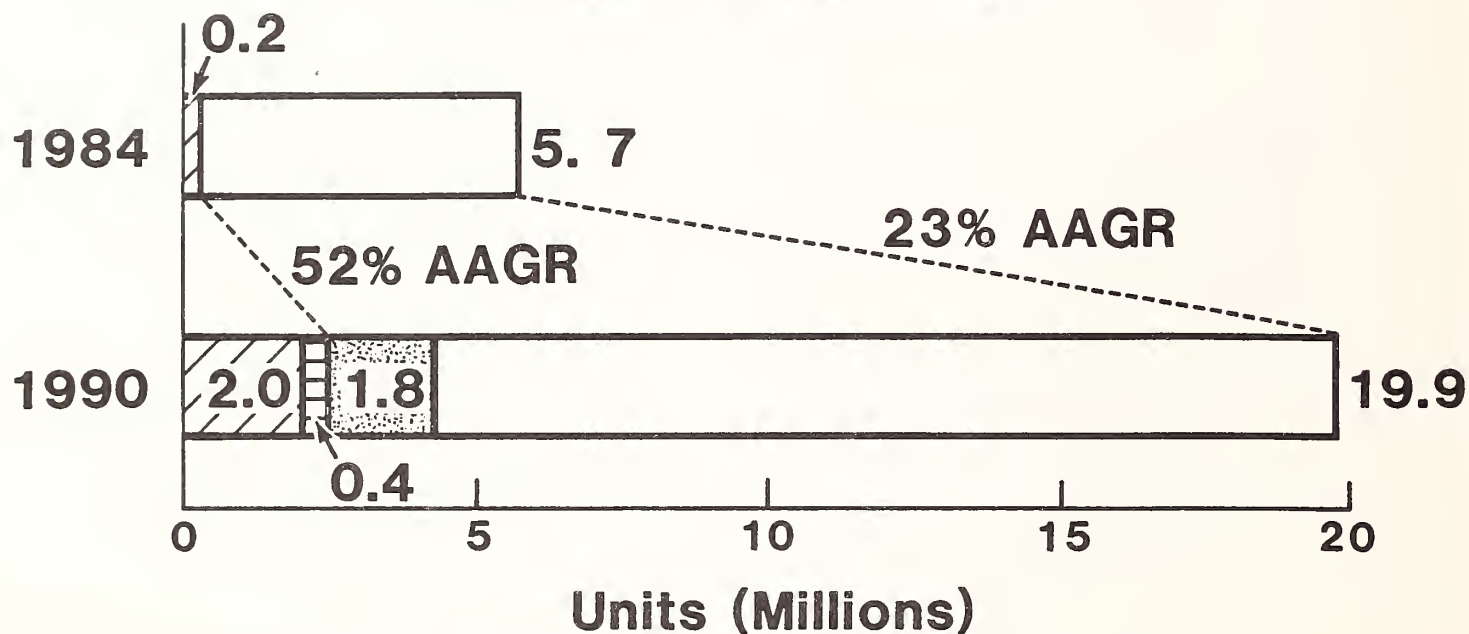
Linked via Emulator

Linked via Hardwired ROM (e.g., IBM PC/3270)

Linked via Modem-Communication Software

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- Industry trends such as technology growth and IBM strategy impact the micro-mainframe market.

    • Technology changes, such as VLSI circuits, will impact the micro-mainframe market both postively and negatively. Easier user interfaces and transparent host access will be developed. Increased chip capability will also provide greater memory storage and processing abilities, enabling much of the data now stored only on a host to reside permanently on a microcomputer.

    • IBM's micro-mainframe link approach will redefine the distributed processing hierarchy and eliminate high-performance minicomputer systems operating under reasonably efficient operating systems such as UNIX. Large mainframes will provide centralized control of the network and distributed data bases. Intelligent workstations (microcomputers) will handle program development and maintenance as well as simple transaction processing against personal data.

- This push-pull from all corners, coupled with the trend toward distributed data processing (DDP) using LANs and multiuser systems, will limit the micro-mainframe market to a 27% AAGR from 1984-1990 (see Exhibit III-43).

• Micro-mainframe market trends include:

- The micro-mainframe linkage market will continue to have significant growth, but does not offer broad opportunities to a large number of present and future participants. 1984 market leaders gained their positions due primarily to early market entry and can in no way be considered established leaders. The number of market participants will increase in 1985-1986, but by the end of the decade will level out to a

- 89 -

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EXHIBIT III-43

MICRO-MAINFRAME LINKAGE GROWTH
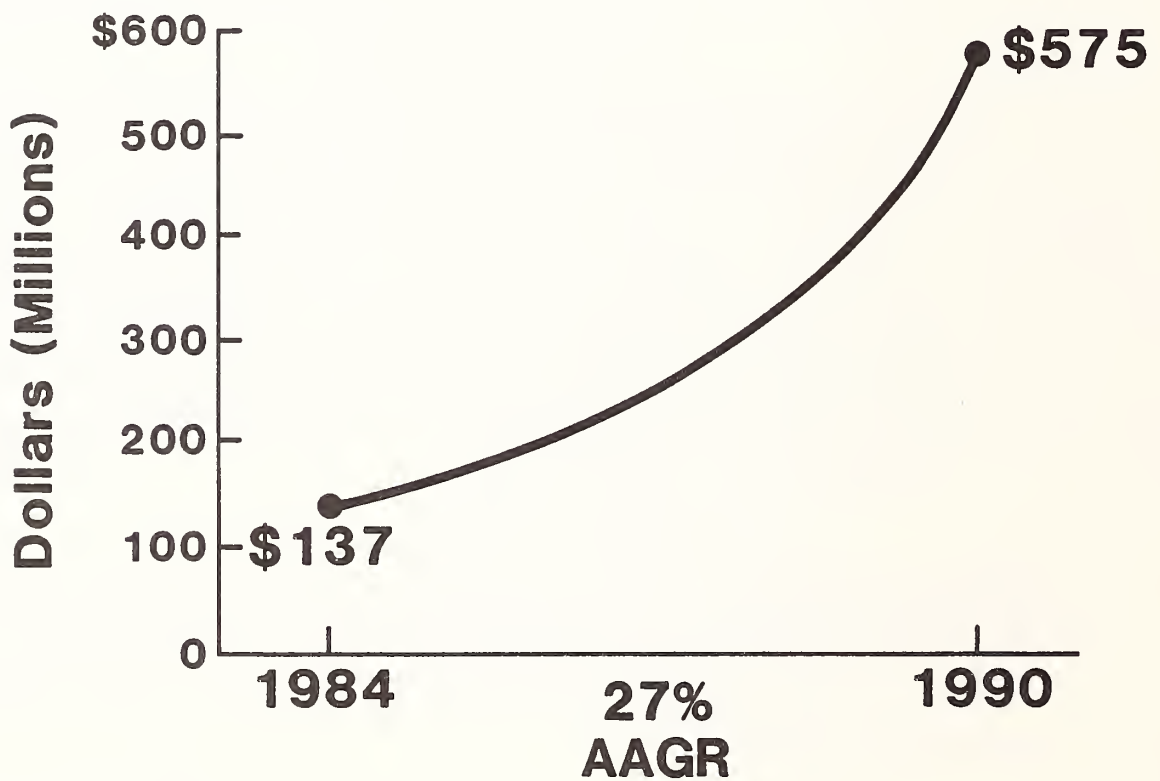
manageable number of known leaders, primarily involved in joint ventures to produce, distribute, and market micro-mainframe linkage products.

3. APPLICATIONS SOFTWARE

a. Market in General

(i) Overview

- Exhibit III-44 presents an overview of the applications software products market structure.

- The applications software market is expected to have the same 25% 1985-1990 AAGR as systems software (see Exhibit III-45). The mainframe/mini versus micro percent of the annual market size is expected to remain almost constant for 1985-1990. This is in contrast to the systems software market in which micros are 12% of the market in 1985 and will be 21% of the market in 1990. This increase is primarily due to the proportionally higher sales of sophisticated application development tools in the micro systems software segment.

- Of the overall $5.7 billion in applications software user expenditures in 1984, 38% was for mainframe packages, 35% for mini applications, and 27% for micro applications. This contrasts to the systems software market where the proportions are: mainframe, 57%; mini, 31%; and micro, 12%. In the micro area the prime usages have historically been cross-industry applications. Systems software products have been limited to a small number of packages per CPU, in contrast to micro applications software, which have significantly more sales units per CPU, offer a greater variety of solutions for the typical user, and thus result in more user expenditures per CPU.

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EXHIBIT III-44

SOFTWARE MARKET STRUCTURE

Software

Systems Software

Applications Software

Cross-Industry

Industry-Specific
- Banking & Finance
- Discrete Manufacturing
- Distribution (Retail and Wholesale)
- Education
- Federal Government
- Insurance
- Medical
- Process Manufacturing
- Services
- State & Local Government
- Telecommunications
- Transportation
- Utilities
- Other

Accounting
- Accounts Payable
- Accounts Receivable
- Fixed Assets
- General Ledger
- Purchasing
- Other

Human Resources
- Benefits
- Payroll
- Personnel
- Other

Planning and Analysis
- Budgeting
- Financial Planning
- Forecasting
- Integrated Analysis Systems
- Modeling
- Spreadsheet Systems
- Project Management
- Other

Engineering and Scientific
- Chemical/Biological
- Electrical
- Mechanical
- Piping
- Nuclear
- Statistics/Operations Research
- Structural Analysis
- Other

Education and Training
- Authoring Languages
- Computer-Assisted Instruction
- Other

Other Cross-Industry
- Business Graphics
- Sales, Marketing and Distribution
- Word Processing
- Desktop Managers
- Other

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EXHIBIT III-45

APPLICATIONS SOFTWARE PRODUCTS MARKET, 1985-1990

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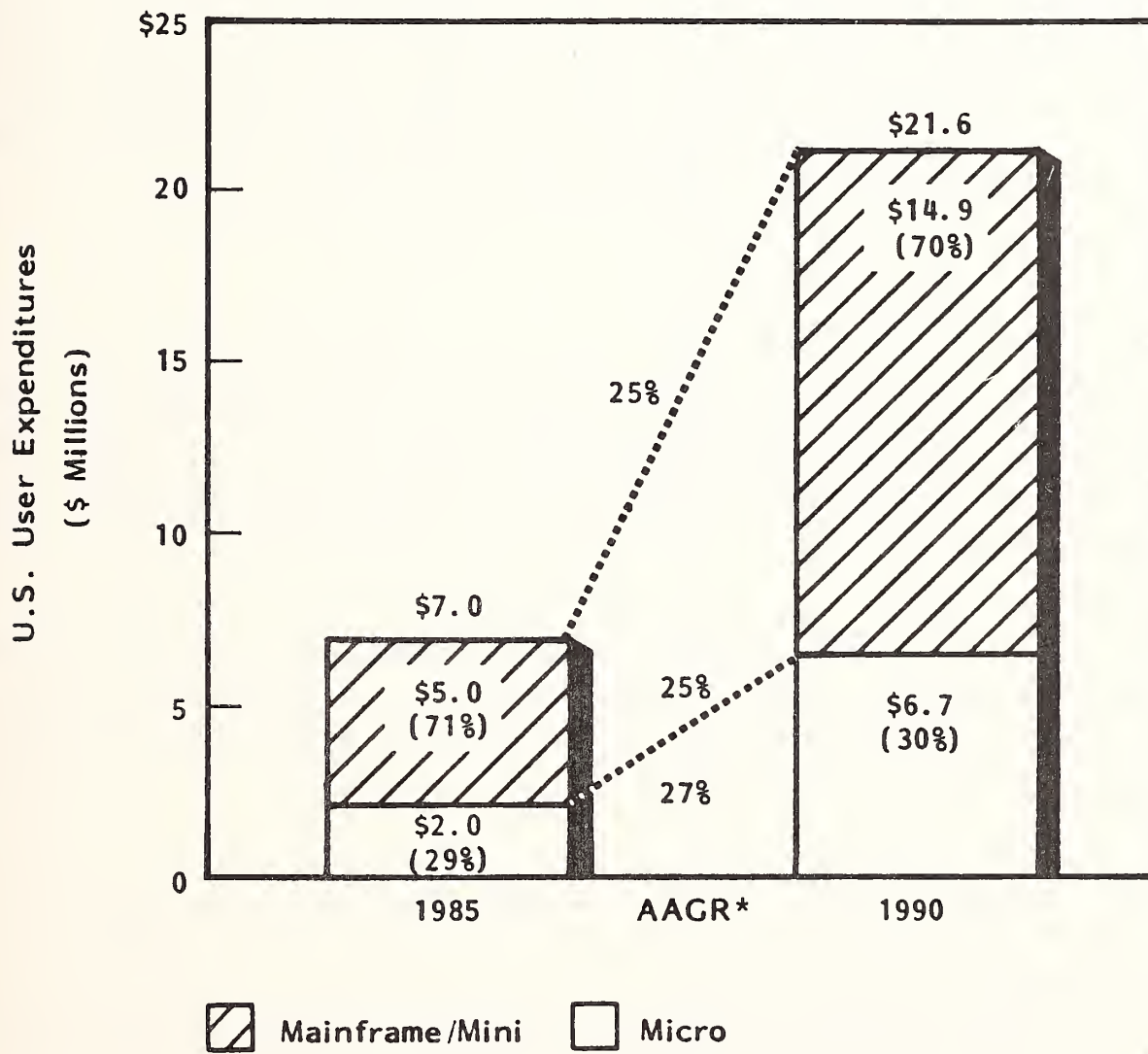
(ii)   Hardware Vendors

- In the applications software products market in 1984, hardware vendors accounted for 27% of user expenditures. This contrasts with the sytems software market in which hardware vendors accounted for 47% of the user expenditures. The higher dominance of this latter market is a result of a strategic decision by hardware vendors to lock in users to their operating systems and communications software as a means of account control.

  - Viewed from system type, hardware vendors provided 31% of mainframe applications software, 30% of mini applications software, and 18% of micro applications software in 1984.

    (iii)   Large Vendors

- Vendors with revenue over $10 million accounted for 58% of the overall $5.7 billion of applications software in 1984. These large sellers accounted for: 70% of mainframe applications, 40% of mini applications, and 64% of micro applications.

- In 1984, the top 10 applications software vendors accounted for 30% of the market (see Exhibit III-46). This contrasts to the systems software top 10 vendors which accounted for almost 50% of the market. There are several reasons for this:

  - IBM dominance in the operating system market--12% of share.

  - The additional maturity of the systems software market where the established vendors are older and larger.

- Two significant issues can be noted in regards to independent software product vendors (see Exhibit III-47).

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EXHIBIT III-46

APPLICATIONS SOFTWARE PRODUCT LEADERS, 1984

RANK	COMPANY	USER EXPENDITURES ($ Millions)	MARKET SHARE (Percent)
1	IBM	$711	12%
2	Lotus*	280	5
3	NCR	150	3
4	MSA	120	2
5	Hewlett-Packard	108	2
6	Wang	90	2
7	Apple*	80	1
8	Tandy*	80	1
9	Microsoft*	74	1
10	Burroughs	72	1

Total Applications Software Product Market = $6,000.

Top 10 = 30% of Market

* Includes distribution revenue; see page 2

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EXHIBIT III-47

APPLICATIONS SOFTWARE PRODUCT INDEPENDENT
(NON-HARDWARE) LEADERS, 1984

RANK	COMPANY	USER EXPENDITURES ($ Millions)	MARKET SHARE (Percent)
1	Lotus *	$280	7%
2	MSA	120	3
3	Microsoft	74	2
4	Dun & Bradstreet	69	2
5	MicroPro	68	2
6	GEISCO (Software International)	37	1
7	McDonnell Douglas	29	1
8	Integrated Software Systems	29	1
9	Policy Management Systems	27	1
10	Advanced Systems	26	1
10	American Software	26	1

Total Applications Software Product Independent Market = $4,200

Top 10 = 22% of Market

*Includes distribution revenue; see page 2

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-       Only one vendor--Microsoft--is a leader in both the systems as well as the applications software marketplace, highlighting the difficulty of being a major success in both of the two very different business arenas.

-       In the applications leader list, only one vendor--Policy Management Systems--accrues most of its revenue from an industry-specific application (property and casualty insurance).   Other vendors primarily focus on cross-industry applications. This is primarily due to the fact that the cross-industry markets began earlier than industry-specific markets, allowing vendors more time to gain market share and become established leaders.

(iv)   Mainframe/Mini/Micro

(a)   Mainframe/Mini

• Mainframe applications leaders (top 10) had 39% of the mainframe applications market in 1984, in contrast to mini leaders who totaled less than 30% (see Exhibits III-48 and III-49). Nine of the 10 leading mini vendors are also hardware vendors.

• The mini applications market is dominated by a large number of VARs and small private companies that provide applications solutions.

• Mini hardware vendors that provide applications software do so in a form of office automation solutions such as DEC's ALL in ONE or Data General's CEO. These are very generic office products.

(b)   Micro

• The top 10 micro software leaders in 1984 accounted for over 55% of the overall micro applications software market (see Exhibit III-50).   Three hardware vendors are in the list (IBM, Apple, Tandy), and two primarily

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EXHIBIT III-48

MAINFRAME APPLICATIONS SOFTWARE PRODUCT LEADERS, 1984

RANK	COMPANY	USER EXPENDITURES ($ Millions)	MARKET SHARE (Percent)
1	IBM	$450	21%
2	MSA	150	5
3	Burroughs	64	3
4	Dun & Bradstreet	55	2
5	CDC	50	2
6	NCR	44	2
7	Honeywell	36	1
8	GEISCO	30	1
9	Integrated Software Systems	27	1
10	Policy Management Systems	27	1

Total Mainframe Applications Software Product Market = $2,200 Million

Top 10 = 39% of Market

EXHIBIT III-49

MINI APPLICATIONS SOFTWARE PRODUCT LEADERS, 1984

RANK	COMPANY	USER EXPENDITURES ($ Millions)	MARKET SHARE (Percent)
1	IBM	$159	8%
2	Hewlett-Packard	107	5
3	NCR	105	5
4	Wang	89	4
5	Data General	44	2
6	Prime	30	1
7	DEC	18	1
8	Applied Communications Inc.	18	1
9	Sperry	17	1
10	AT&T	15	1

Total Mini Application Software Product Market = $2,000 Million

Top 10 = 29% of Market

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EXHIBIT III-50

MICRO APPLICATIONS SOFTWARE PRODUCT LEADERS, 1984

RANK	COMPANY	USER EXPENDITURES* ($ Millions)	MARKET SHARE (Percent)
1	Lotus	$280	18%
2	IBM	102	7
3	Apple	80	5
4	Tandy	80	5
5	Microsoft	74	5
6	MicroPro	68	4
7	Multimate	40	3
8	Ashton-Tate	32	2
9	Computer Assoc.	26	2
10	MSA (Peachtree)	22	2
10	Great Plains Software	22	2

Total Micro Applications Software Product Market $1,545

Top 10 = 53% of Market

*Includes distribution revenue; see page 2

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mainframe software vendors (MSA and Computer Associates). Interesting to note is that most hardware vendors' micro applications sales were from packages developed by independent or outside vendors, and mainframe vendor products were from acquisitions of established micro software companies.

b.   Cross-Industry in General

- The overall applications software market cross-industry segment will have a 19% growth during the forecast period as opposed to the industry-specific segments that will have a 32% AAGR (see Exhibit III-51).

- This will be due to:

  -    Maturing of the cross-industry market which consequently has more saturation.

  -    Generally lower average unit price for cross-industry packages versus industry-specific packages.

  -    Since management now wants to automate "the heart" of the business, industry specific packages will be the means to accomplish this.

- Segmentation of the market is as follows:

  -    Mainframe/mini.

      .   The cross-industry segment for mainframe/mini will have a slightly lower growth rate than the micro segment at 17% versus 20% (see Exhibit III-52).

      .   The cross-industry segment will decrease from 45% of total applications expenditures in 1985 to 34% in 1990. This is accounted for by the fact that more "fine tuned" industry-

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EXHIBIT III-51

TOTAL APPLICATIONS SOFTWARE PRODUCTS MARKET BY SEGMENT TYPE
1985-1990

Cross-Industry   Industry-Specific

*Average Annual Growth Rate

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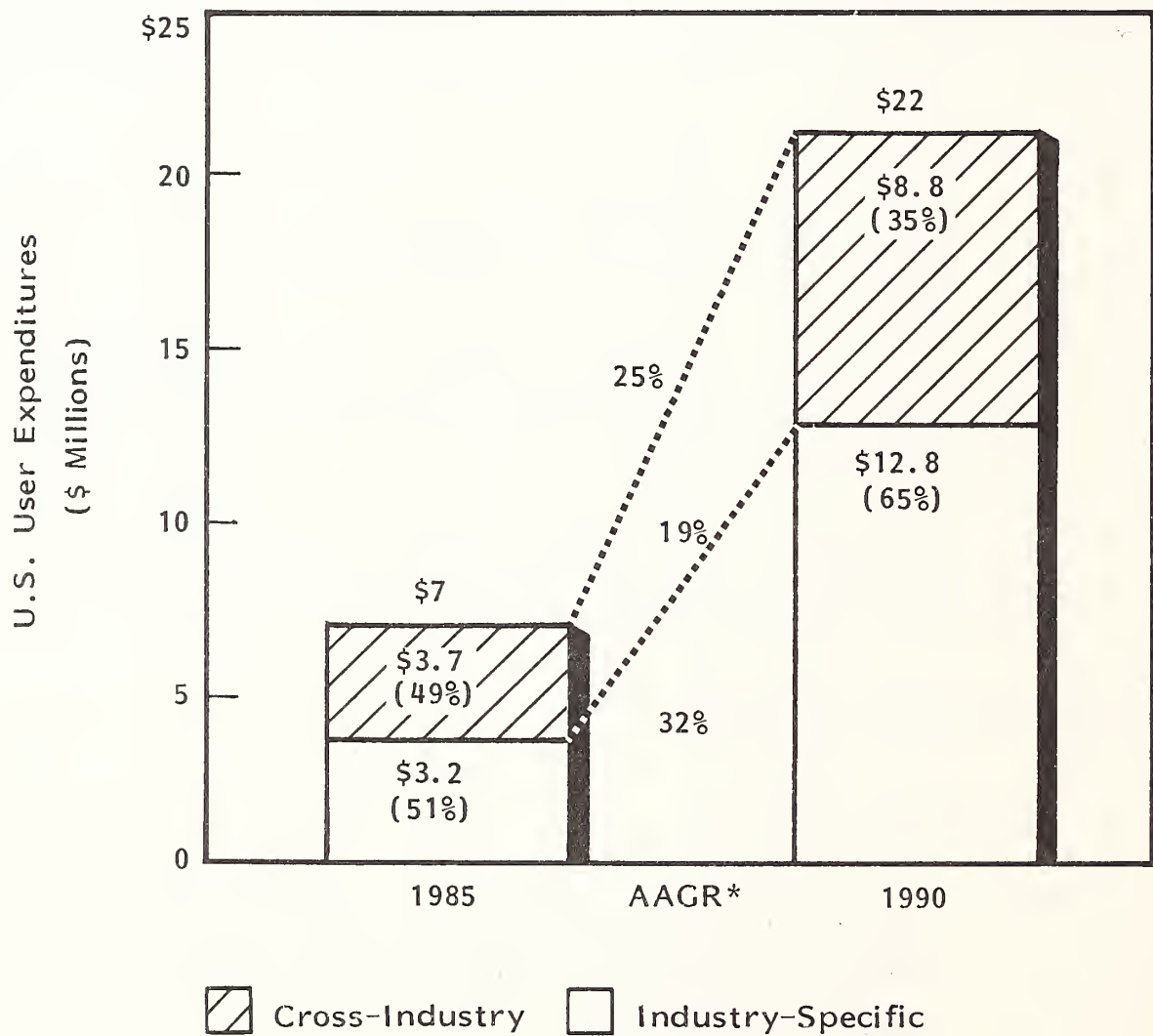
EXHIBIT III-52

APPLICATIONS SOFTWARE PRODUCTS MARKET BY SEGMENT TYPE, 1985-1990
(Mainframe/Mini)

Cross-Industry   Industry-Specific

*Average Annual Growth Rate

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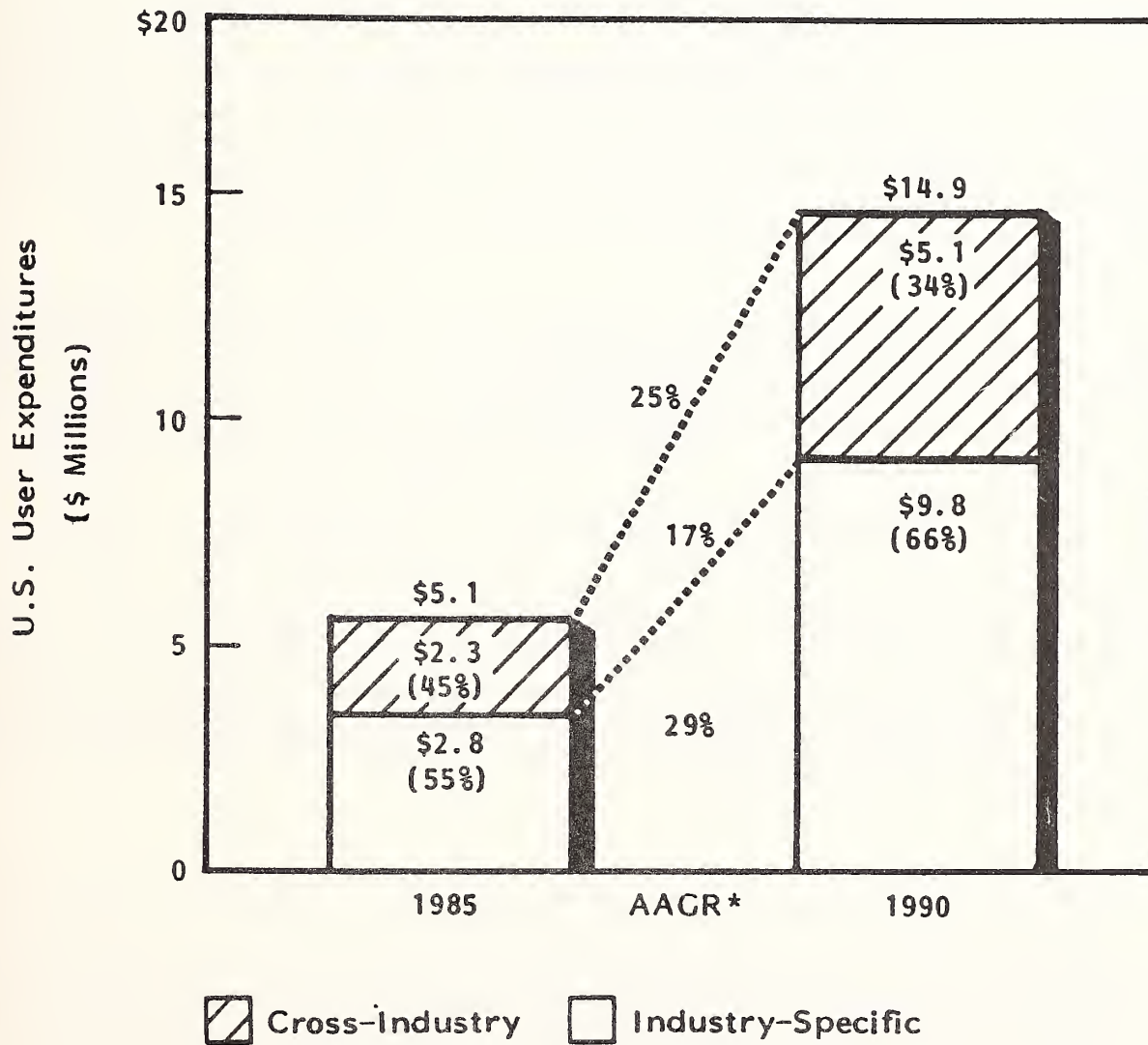
specific packages are becoming increasingly popular as users focus on automating their primary business operations which are unique to their industries.

- Micros.

    . Cross-industry applications for micros will account for a lesser growth than industry-specific applications during the forecast period (20% versus 43%). This is because users are becoming sophisticated enough to be receptive to the more complex, but higher payoff industry-specific solutions (see Exhibit III-53). In 1990, cross-industry applications will still account for over 50% of user expenditures, down from 75% in 1985.

    . In order to help vendors better understand the cross-industry market, we have outlined below the six major cross-industry segments with a brief analysis of each (see Exhibit III-54).

    (i) Planning and Analysis

- The applications in the planning and analysis (P&A) segment include: budgeting, financial planning, forecasting, project management, modeling, spreadsheets, decision support systems (DSS), and integrated analysis packages (i.e., Framework, Symphony).

- Planning and analysis, a $1.3 billion market in 1985, is the largest cross-industry application segment and will continue to remain so through the end of the forecast period (see Exhibits III-54 and III-55). The market is being stimulated by the growing installed base of micros that either introduce the user to the benefits of financial tools (spreadsheets) or create the desire within more experienced users for power beyond existing systems.

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EXHIBIT III-53

MICROCOMPUTER APPLICATIONS
SOFTWARE SHIPMENTS
U.S. BUSINESS
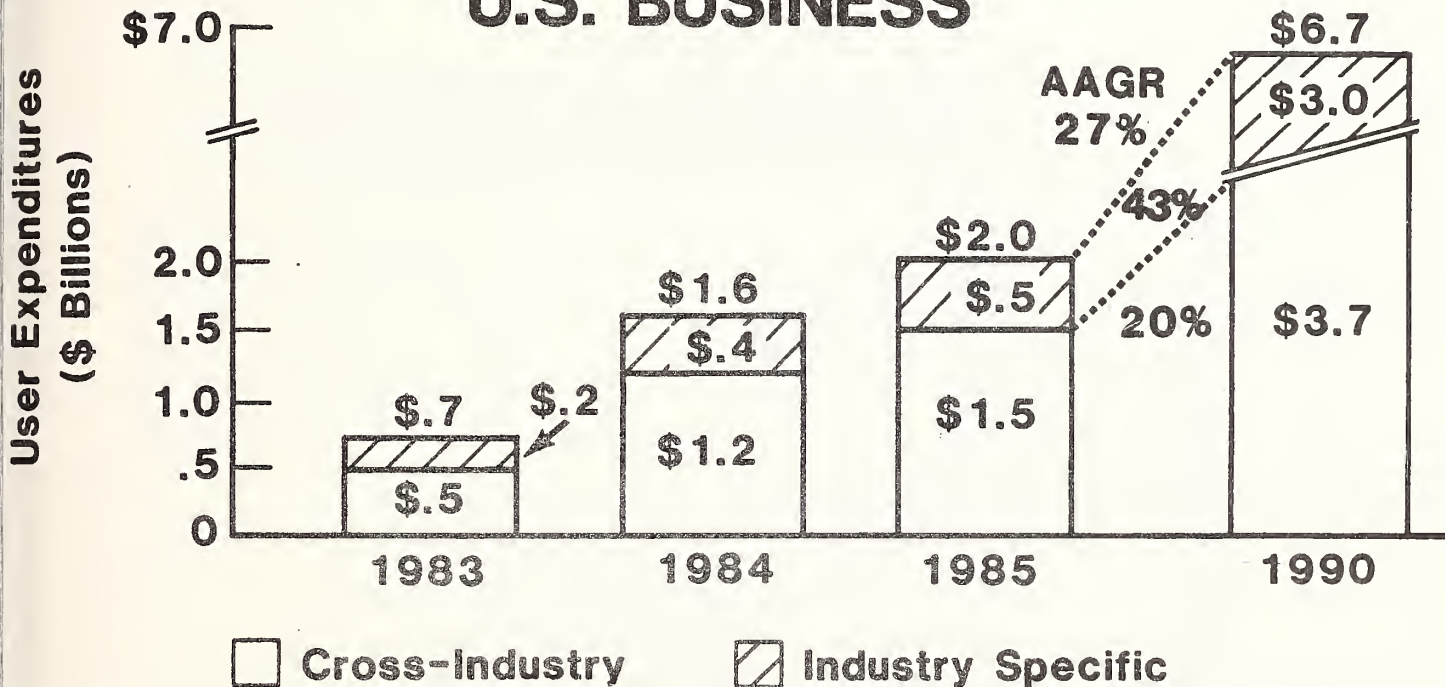
EXHIBIT III-54

CROSS-INDUSTRY APPLICATIONS SOFTWARE MARKET, 1985-1990

		AAGR* 1985-1990
Planning and Analysis	$1.3 / $2.9	18%
Accounting	$1.2 / $2.6	17
Human Resources	$0.4 / $0.9	14
Engineering and Scientific	$0.2 / $0.6	25
Education and Training	$0.08 / $0.5	44
Other Cross-Industry	$0.6 / $1.3	19

U.S. User Expenditures
($ Billions)

		AAGR*
1985	$3.7	19%
1990	$8.8	

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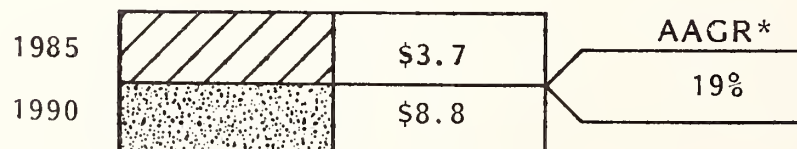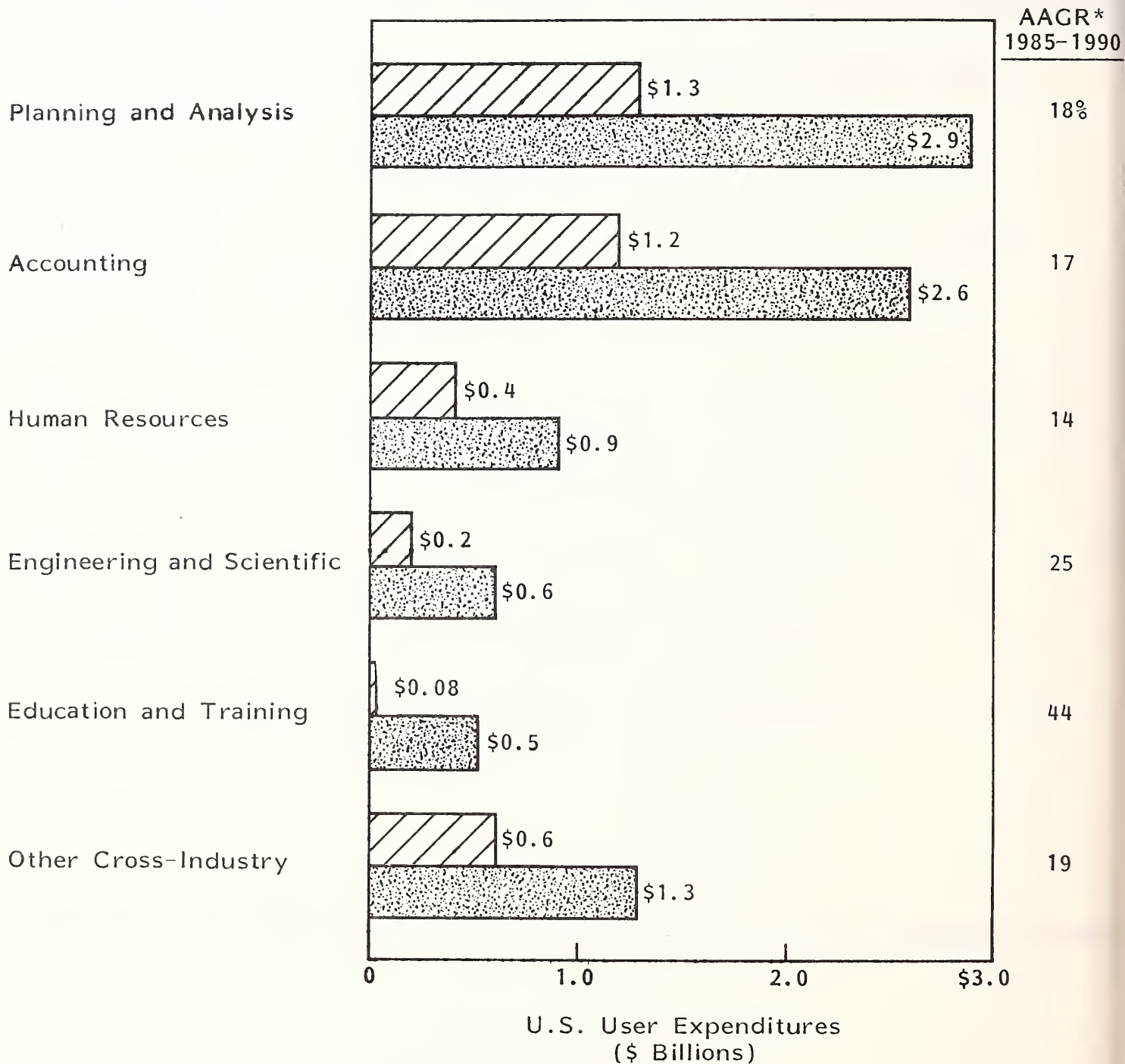
EXHIBIT III-55

PLANNING AND ANALYSIS APPLICATIONS SOFTWARE MARKET, 1985-1990
(Cross-Industry)

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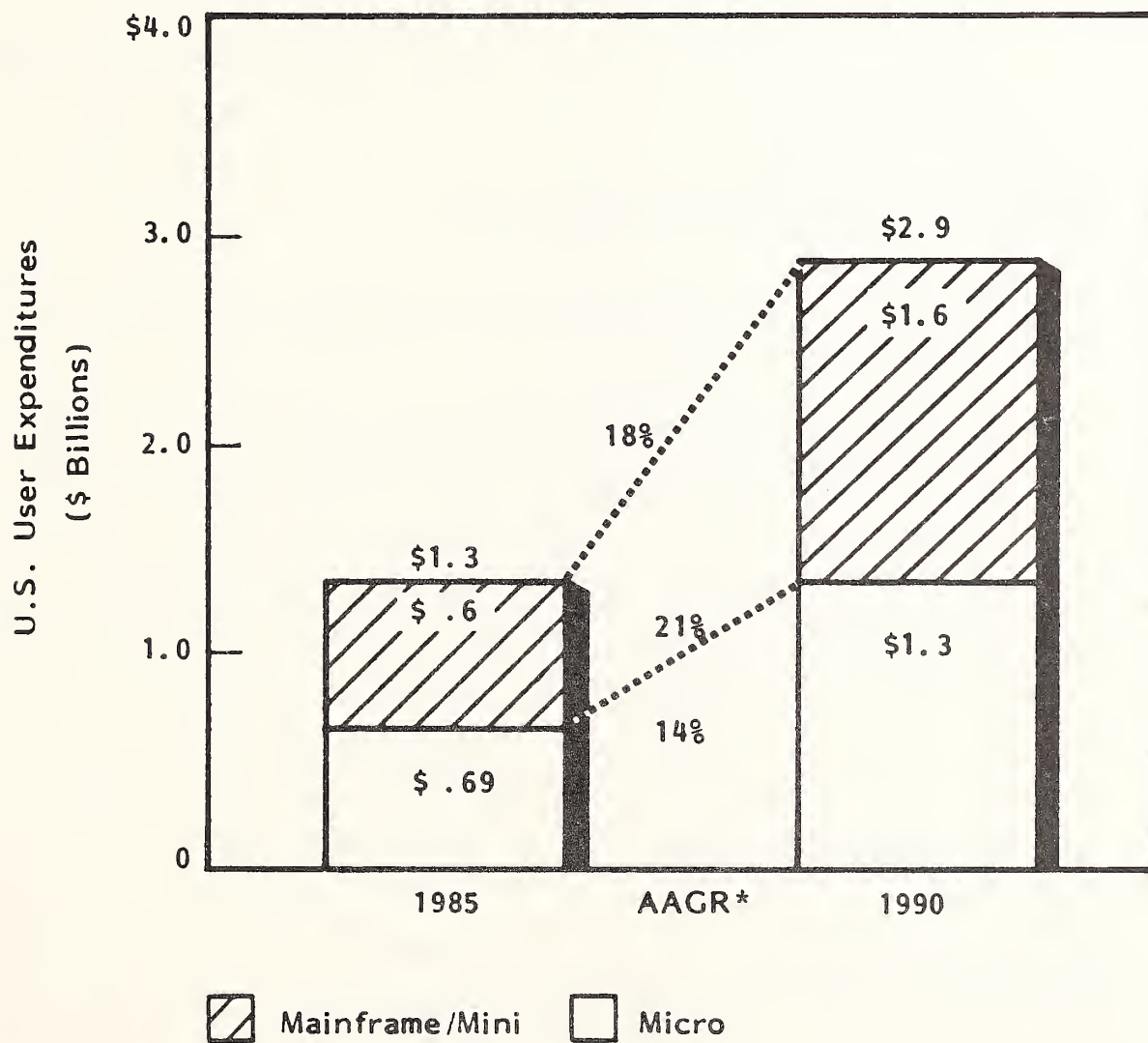
- Positive factors impacting the P&A market are:

    - More powerful micro hardware.

    - More cost-effective mass storage; e.g., hard disks and CD-ROM.

    - Improved integration of P&A systems with transaction-processing systems.

    - Increasing acceptance of micro-mainframe links for easier access to larger data bases.

- Negative forces influencing the market are:

    - The increased time to learn new and more complex P&A products.

    - P&A systems with various modules that can take a year or longer for the entire application to be installed adequately due to complexity.

- Successful P&A products for the remainder of the decade must be closely related to functions such as DBMS, data dictionaries, graphics, statistical capabilities, and electronic mail or other communications.

- P&A systems must also closely integrate into transaction-oriented systems to give users access to more timely data for decisionmaking.

- See the section entitled "Selected Micro Applications" for a more thorough commentary on the micro spreadsheet market.

    (ii) Accounting

- The accounting segment is the second largest of the cross-industry segments in 1985, and will retain its market position throughout the forecast period (see Exhibit III-56).

EXHIBIT III-56

ACCOUNTING APPLICATIONS SOFTWARE MARKET, 1985-1990
(Cross-Industry)

*Average Annual Growth Rate

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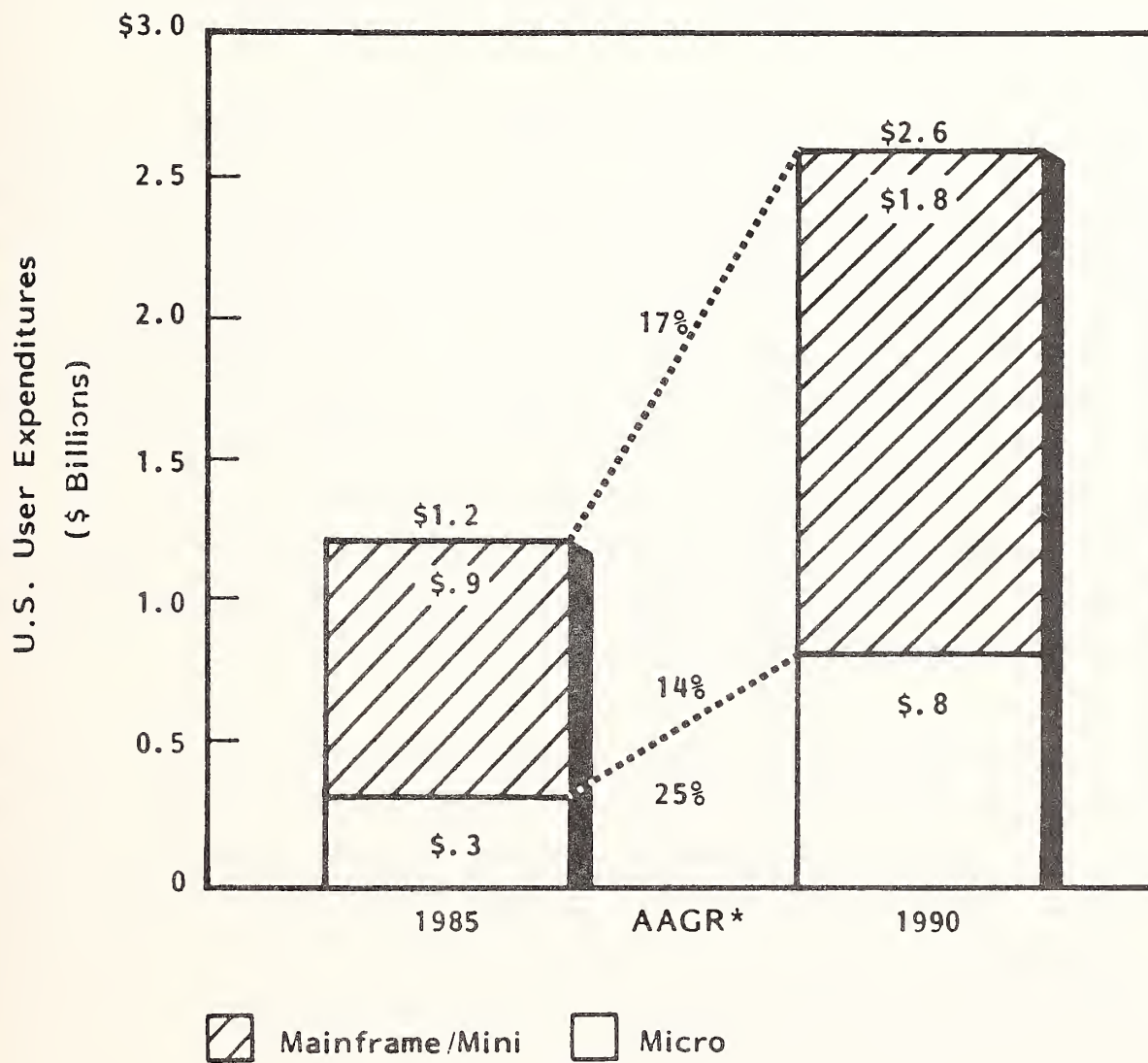
- The accounting market is one of the oldest and most penetrated tradi-
tional applications markets, and thus has a larger installed base and
lower growth rate.

- The micro segment of the market will increase in percentage from 25%
in 1985 to 31% in 1990. For further information on the micro
accounting market, see "Selected Micro Applications" later in this
report.

- Demand for financial detail to support analytical systems continues to
increase. Management's need for closer busines control increases the pressure
to automate all components of the accounting function. In the 1985 survey
conducted by INPUT of information systems managers within the 14 major
industry markets, respondents in 8 of the 14 markets included the purchase of
accounting software as a prime objective for 1986. This segment ranked
highest of all cross-industry segments for purchase intentions.

- Accounting software will continue to increase its level of integration, both
between formerly discrete accounting functions and between other cross-
industry, industry-specific, and DBMS functions.

- The most successful accounting package vendors have been older, well-estab-
lished vendors who introduced their products over a decade ago. These
vendors will continue to remain strong. As corporations automate, there will
be more of a demand to standardize accounting systems across divisions;
consequently, these leaders with installed products will have the best chance
to make these additional sales.

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(iii)   Human Resources

● The cross industry human resource segment includes such applications as:

-    Payroll.

-    Benefits.

-    Personnel.

-    Human resource management systems.

● This cross-industry segment will experience the slowest growth of all the cross-industry segments, but will still be close to a $1 billion market in 1990 (see Exhibit III-57).

● Reasons for this slow growth are:

-    Historically, companies have tended not to support the personnel function with automation dollars, deferring instead to "line" operational departments such as production in a manufacturing firm.

-    Reduced government pressure for personnel-specific health and safety measures such as OSHA have decreased the urgency to monitor these activities effectively by automation.

-    Remote computing services (RCS) companies have been and will continue to be extremely aggressive in the payroll area. They can still provide economic solutions that handle businesses with as few as one employee.

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EXHIBIT III-57

HUMAN RESOURCES APPLICATIONS SOFTWARE MARKET, 1985-1990
(Industry-Specific)

*Average Annual Growth Rate

- 112 -
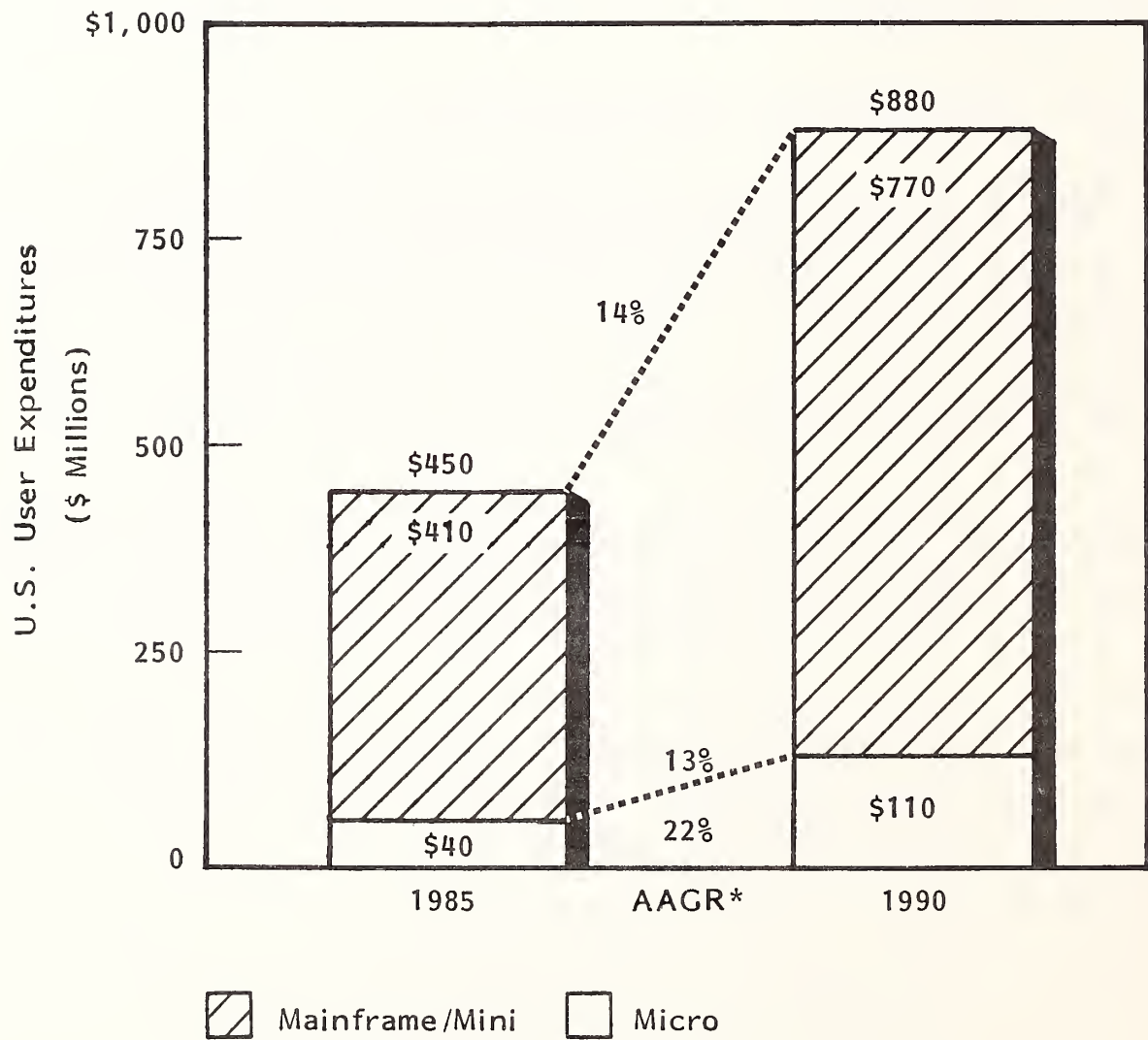
- Forces stimulating the human resource marketplace include:

  - To remain competitive in the recruiting marketplace and to better retain employees, companies are finding that they must increasingly customize salaries and benefits packages. Consequently, this will stimulate the purchase of new software.

  - To develop or retain competitive strength, companies are finding that human resources applications such as skills inventory are a key. By tracking who is doing what, a company can maximize its people potential by having employees well matched for specific jobs. This again in turn encourages the purchase of new, more sophisticated software.

- In INPUT's 1985 annual survey of information systems managers, the purchase of software for the human resource function ranked high in importance in 5 of the 14 vertical industry segments. This type of software ranked second in importance to accounting software in the overall 14-industry survey.

    (iv)   Engineering and Scientific

- The continued shortage of engineers is making companies look for methods to improve engineer productivity. These companies are leveraging their engineering resources by purchasing computerized engineering devices (of which software is a key aspect) to improve productivity.

- In 1985, the engineering and scientific software market will be $180 million, growing to over $500 million in 1990 (see Exhibit III-58). The micro portion of the market is expected to grow from 17% in 1985 to 22% in 1990. This overall segment will have the second highest AAGR throughout the forecast period of all cross-industry segments.

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EXHIBIT III-58

ENGINEERING AND SCIENTIFIC APPLICATIONS SOFTWARE MARKET, 1985-1990
(Industry-Specific)
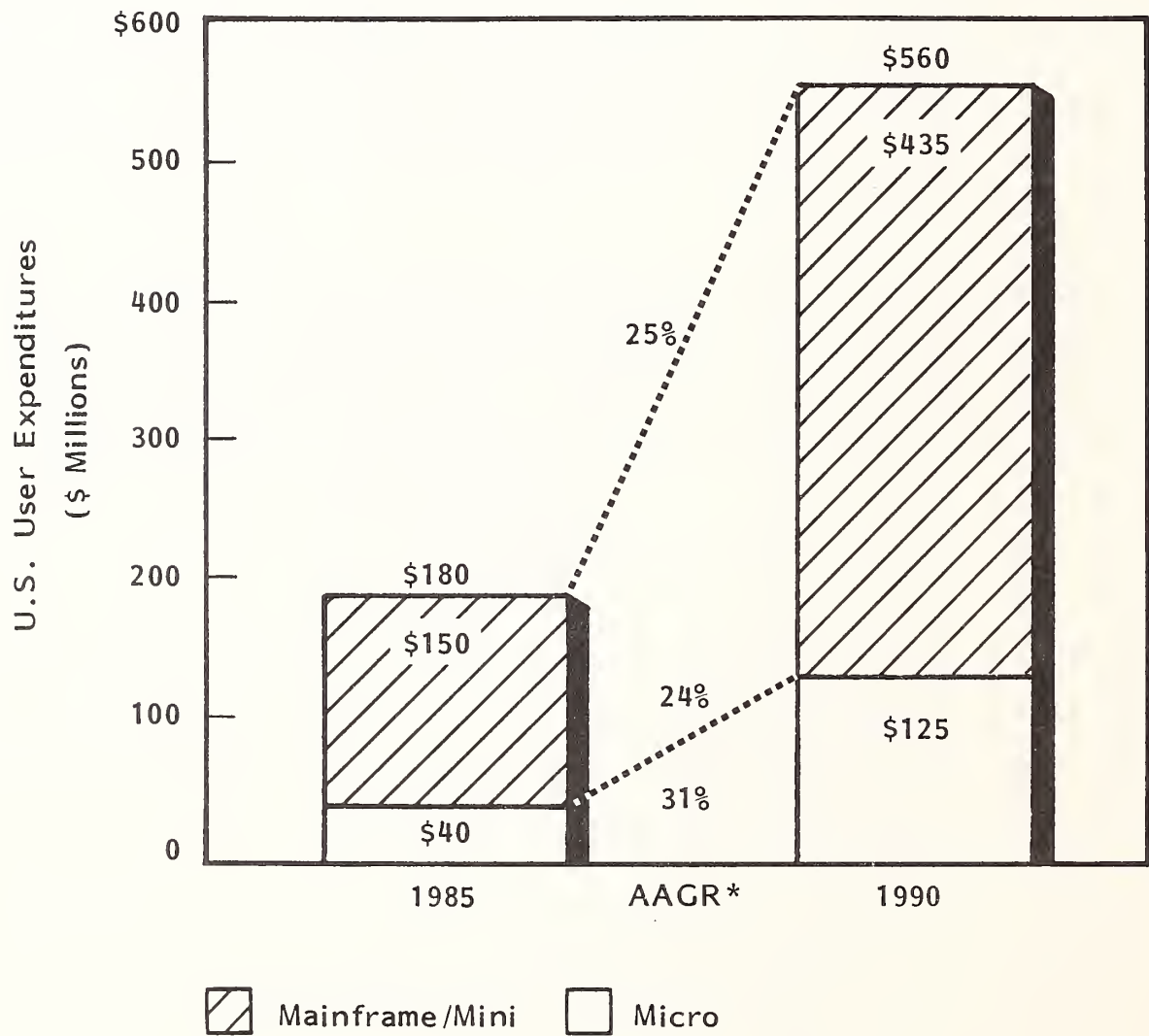
*Average Annual Growth Rate

- One of the major factors stimulating the growth of the engineering and scientific market is the emergence of new, more cost-effective hardware designed primarily for engineering and scientific applications. The economics and ease of use of these new computers will greatly expand the population of users and will thus stimulate significant software sales. For example, RISC computers under development by Hewlett-Packard and IBM (to name but a few) will be introduced in 1986. In many cases, these higher speed systems will be able to utilize existing software, but there will be the opportunity for software developers to rewrite software especially designed to maximize the efficiency of this type of hardware.

   (v)   Education and Training

- The education and training segment encompasses activities that are conducted within organizations whose primary purpose is other than education. For example, education and training services performed by firms involved in manufacturing, banking, retail, and transportation are included in this segment. Education software expenditures that occur in educational institutions (i.e., schools) is included in the Education Industry-Specific market segment.

- INPUT estimates that by 1990 over 50% of all white collar workers will use some type of computer on the job. With fewer than one in five white collar workers currently using a computer, a major opportunity exists to train new users.

- The education and training cross industry segment will have the highest AAGR 1985-1990 (44%) of all cross-industry segments. This growth rate is heavily influenced by the small size of its 1985 base (see Exhibit III-59). This segment's dollar size in 1985 and 1990 will continue to rank last compared to all other cross-industry segments. In spite of this, the 1990 dollar size will not be insignificant—over $500 million.

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EXHIBIT III-59

EDUCATION AND TRAINING APPLICATIONS SOFTWARE MARKET, 1985-1990
(Cross-Industry)

*Average Annual Growth Rate

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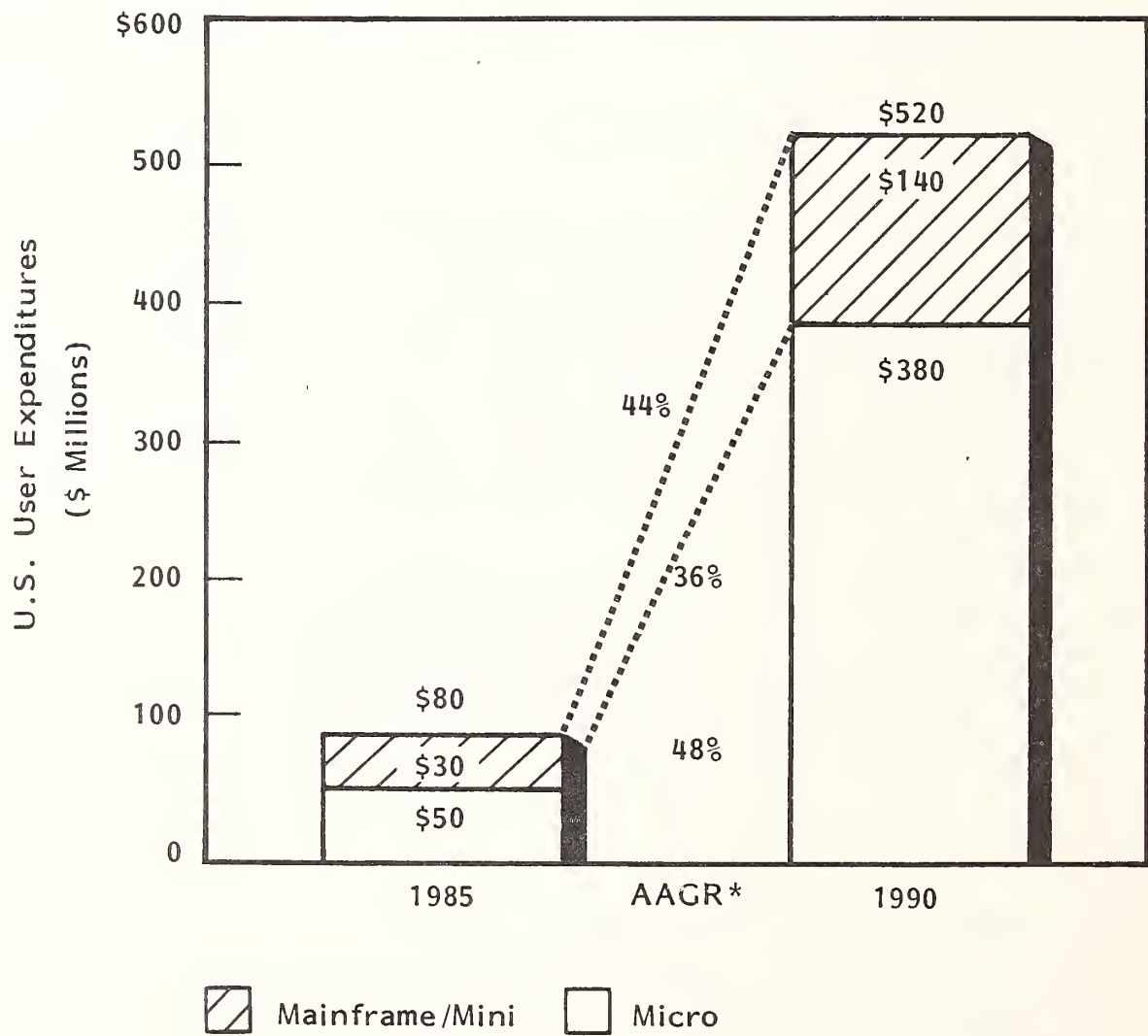
- Education and training is one of only two cross industry segments in which the micro portion of the market greatly exceeds the mainframe portion (63% in 1985--73% in 1990). This is due to low-cost quality software packages available on micros for numerous training applications. Wherever there is a PC, there is the potential for an educational workstation.

- From a penetration perspective, in 1985 about $6 will be spent per micro CPU for education and training. In 1990, it will be about $19 per CPU. This significant increase in penetration reflects the use of micros for training, not only for specialized computer operations, but also in many areas of personal development and growth.

- Additional stimulants to the overall education and training market include:

    - The increasing popularity of complex distributed systems that will increase the need for more comprehensive operational training.

    - Increasing popularity of PC-based interactive videodisks which produce easy to learn instructions. Major established educational video vendors are planning on switching their mode of instruction from conventional video to this computer-oriented method of training.

        (vi) "Other" Cross-Industry Market

- The "other" cross-industry segment includes such applications as:

    - Word processing.

    - Business graphics.

    - Sales and marketing applications.

    - Desktop managers (i.e., Sidekick, et al).

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- As shown in Exhibit III-54, the total "other" cross-industry segment is expected to retain its ranking as third among cross-industry applications from 1985 through 1990.

- This segment (along with education and training) has a very high micro percentage of market throughout the forecast period (70% in 1985 and 73% in 1990). Exhibit III-60 shows this small computer market growing from almost $400 million in 1985 to almost $1 billion in 1990.

- Factors influencing the growth of the entire "other" segment include:

  - The popularity of graphics among decision makers which make the numbers "come alive." This has raised managers' interest in business graphics especially in the area of presentation graphics. In addition, products as Apple's MacIntosh have stimulated a new market called "desktop publishing." This market is heavily graphics-oriented and hence stimulates the graphics software market. A further stimulus is the action of micro word processing vendors such as Multimate which are integrating graphics capabilities within their word processing packages.

  - User interest in word processing packages that cross over all types of mainframe through micro systems. See the segment entitled "Selected Micro Applications" for elaboration of the micro word processing market.

    (vii) Major Micro Software Market Segments

- INPUT's market forecast for most significant types of micro software is presented in Exhibit III-61. The exhibit segments the market into major cross-industry microcomputer products and provides growth rates, for these segments for U.S. business in general as well as for Fortune 1000 accounts alone. High growth segments are highlighted in the section to follow.

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EXHIBIT III-60

"OTHER" CROSS-INDUSTRY APPLICATIONS SOFTWARE MARKET, 1985-1990

*Average Annual Growth Rate

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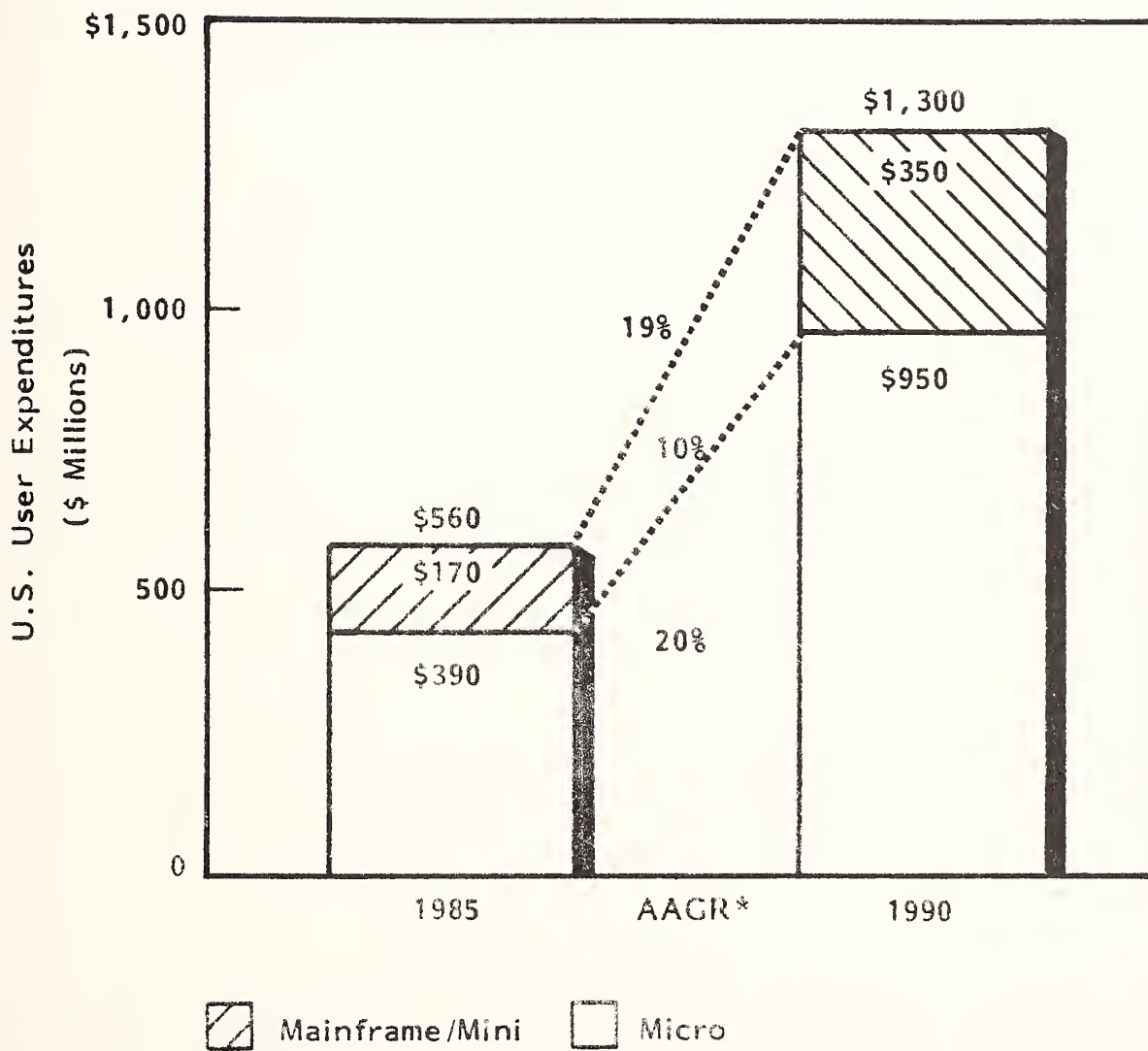
EXHIBIT III-61

USER EXPENDITURES FORECAST
CROSS-INDUSTRY MICROCOMPUTER SOFTWARE MARKET, 1984-1985

MARKET CATEGORY	($M) 1984	84-85 GROWTH	($M) 1985	($M) 1986	($M) 1987	($M) 1988	($M) 1989	($M) 1990	85-90 AAGR
SPREADSHEET									
U.S. BUSINESS	300	30%	390	449	493	528	554	571	9%
FORTUNE 1000	60	25%	75	84	90	94	97	99	6%
WORD PROCESSING									
U.S. BUSINESS	255	30%	330	415	500	575	650	710	16%
FORTUNE 1000	38	25%	48	59	72	86	102	117	20%
DATABASE MANAGEMENT SYSTEMS									
U.S. BUSINESS	251	40%	352	475	617	790	985	1195	28%
FORTUNE 1000	30	35%	41	57	77	102	127	152	30%
ACCOUNTING									
U.S. BUSINESS	195	37%	267	374	505	631	732	813	25%
FORTUNE 1000	6	15%	7	8	9	10	11	12	12%
INTEGRATED SOFTWARE									
U.S. BUSINESS	159	15%	183	190	190	180	171	163	-2%
FORTUNE 1000	35	20%	42	44	45	45	43	40	-1%
PROJECT MANAGEMENT									
U.S. BUSINESS	20	40%	28	39	51	64	73	82	24%
FORTUNE 1000	11	40%	15	21	27	32	37	41	22%
DECISION SUPPORT SYSTEMS									
U.S. BUSINESS	25	40%	35	46	55	63	70	79	18%
FORTUNE 1000	20	40%	28	36	44	50	56	63	18%
GRAPHICS									
U.S. BUSINESS	60	45%	87	124	174	226	283	340	31%
FORTUNE 1000	15	50%	23	33	46	62	80	96	34%
COMMUNICATIONS									
U.S. BUSINESS	45	45%	65	95	132	185	250	325	38%
FORTUNE 1000	9	50%	14	20	29	42	58	78	42%
ARTIFICIAL INTELLIGENCE									
U.S. BUSINESS	5	60%	8	14	25	45	58	102	66%
FORTUNE 1000	2.5	50%	4	7	12	22	35	56	72%
OTHER *									
U.S. BUSINESS	128	25%	160	200	250	300	360	432	22%
FORTUNE 1000	26	24%	32	39	49	60	71	84	22%
TOTAL U.S. BUSINESS **	1443	32%	1905	2421	2993	3587	4208	4812	20%
TOTAL FORTUNE 1000 MARKET **	252.5	30%	329	408	500	605	717	838	21%

* OTHER INCLUDES DESKTOP ACCESSORIES, STATISTICS, EDUCATION AND TRAINING,
     HUMAN RESOURCES, SALES AND MARKETING, AND ENGINEERING AND SCIENTIFIC.

** EXCLUDES ALL INDUSTRY-SPECIFIC APPLICATIONS

(viii)   Selected Micro Products

● Exhibit III-62 presents the major or largest segments of micro software. Although DBMS is classified by INPUT as systems software, its usage is so closely allied with applications software that it is included here.

- Planning and analysis is the largest revenue segment in 1985, with almost 30% of the overall micro software user expenditures.

    . Of the major segments, it has the lowest growth rate (13%) for 1985-1990. This is due primarily to a slowing in the spreadsheet market which will increasingly encounter saturation problems.

        - Most early adapters of computers were spreadsheet users.

        - In general, however, many computer users do not need nor will ever need to use spreadsheets; consequently, there is a decrease in sales potential. 1984 major vendor revenue for the spreadsheet segment is highlighted in Exhibit III-63.

    . The P&A segment is, however, doubling in dollars during 1985-1990 and will account for one-sixth of the overall micro software market by 1990.

- The accounting market will also show steep growth. The accounting department in any company is a natural for computerization. As companies (especially small business) continue to automate, accounting will be one of the first applications.

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EXHIBIT III-62

MICROCOMPUTER SOFTWARE:
MAJOR SEGMENT GROWTH 1985-1990
(User Expenditures $ Billions)

	1984	1985	1990	1985-1990 AAGR
Planning and Analysis	$.60	$.70	$1.30	13%
Word Processing	.25	.33	.70	16
DBMS	.25	.35	1.20	28
Accounting	.20	.30	1.00	27

EXHIBIT III-63

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LEADING MICRO SPREADSHEET VENDORS
($ Millions)

VENDORS	1983 REVENUE	1984 REVENUE	1983-1984 GROWTH
Lotus	$45	$110	144%
Microsoft	10	20	100%
VisiCorp	35	8	-77%
SORCIM/IVS	10	5	-50%
Other	–	7	–
Total Revenues	$100	$150	50%
User Expenditures	$200	$300	50%

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- The micro word processing market will continue to grow.

  - As many new users purchase computers, a word processing application is a logical first or second software purchase.

  - Other stimulants to this market include:

    - Impact of connectivity—as connectivity increases in the office automation market, standalone word processing packages will be replaced by LAN versions.

    - Artificial intelligence (AI)—incorporating some types of AI in word processing packages (as Lotus is doing) will make those applications able to learn from individual users and therefore easier to use.

- The DBMS segment is expected to be the fastest growing of the large segments. One of the main uses that white collar workers have for a computer is the storing and manipulating of data. Thus, DBMS is a fundamental application that has widespread appeal, especially as these systems become easier to use. New generations of DBMS will both expand the user base as well as obsolete the old, thus stimulating a large replacement market.

  c.   Industry-Specific

  (i)   Overall

- In 1985, the industry-specific segments of the overall software product market accounted for 51% of the applications software market. In 1990, this percentage is expected to increase to 65%.

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- Industry-specific projected growth reflects several factors:

    . First, as users become more computer literate, they realize the increased payoffs of automated solutions especially at the heart of their businesses. (An example of this is the automation of order processing and inventory control for a distribution firm.)

    . Second, as management of businesses become increasingly receptive to these solutions, they will be willing to invest the needed funds to produce the automated applications.

- Consequently, industry-specific packages will:

    . Command higher prices since the solutions are complex and will be in demand.

    . But will require expertise in the market for which they are being developed, as well as significant time and money investment in development as well as selling, and must be accompanied by extensive training and support.

- This last factor will decrease competition from many large software firms that sell on volume, especially in the micro segment, but will provide opportunities for VARs and smaller software developers.

    (ii)   Highest Growth

- The three highest industries in terms of growth by AAGR are medical, transportation, and telecommunications. These industries rank so high primarily due to the low dollar base from which they began in 1985 (see Exhibit III-64).

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EXHIBIT III-64

INDUSTRY-SPECIFIC APPLICATIONS SOFTWARE MARKETS

INDUSTRY SECTOR	1985-1990 AAGR (Percent)	USER EXPENDITURES ($ Billions)		1984-1990 GROWTH RATE RANK
		1985	1990	
Discrete Manufacturing	24%	$ .7	$2.1	13
Processing Manufacturing	40	0.2	0.9	4
Transporation	42	0.1	0.8	2
Utilities	28	0.03	0.09	10
Telecommunications	41	0.05	0.3	3
Distribution	34	0.3	1.4	6
Banking and Finance	30	0.9	3.5	8
Insurance	26	0.3	0.9	11
Medical	43	0.3	1.8	1
Education	29	0.06	0.2	9
Services	36	0.1	0.5	5
Federal Government	18	0.02	0.06	14
State/Local Government	25	0.04	0.08	12
Other	32	0.07	0.3	7

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- From a user expenditure perspective, rankings in 1985 were:

  - Banking and finance = 1.

  - Discrete manufacturing = 2.

  - Distribution = 3.

  - Insurance = 3.

  - Medical = 3.

- In 1990, the rankings do not change drastically.

  - Banking and finance = 1.

  - Discrete manufacturing = 2.

  - Medical = 3.

  - Distribution = 4.

  - Insurance = 5.

- Banking and finance has enormous changes taking place, primarily due to deregulation which has lead to increased competition from existing financial institutions as well as competition from diversified institutions such as insurance companies offering financial services products. These forces lead to a demand for new products which banks must provide to remain competitive. Thus, old automated systems are becoming obsolete and will need replacement.

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- The main driving force for automation in discrete manufacturing companies is the urgent need to become more competitive vis-a-vis foreign competition.

- The pressure to automate systems in the medical marketplace is primarily a result of the need to contain costs due to government pressure.

- The insurance industry will decrease in dollar ranking 1985-1990 primarily due to profitability pressures (especially in the property and casualty industries) that will slow the automation investment.

(iii) Mainframe/Mini

- In 1985, the banking/finance and discrete manufacturing segments will account for 55% of overall mainframe/mini user expenditures for industry-specific software (see Exhibit III-65). In 1990, the percentage of these two segments will total 48%. This will be primarily due to the lower than segment average AAGR (29%) by the discrete manufacturing segment (20%) in spite of large dollar increase over the forecast period. Both segments will still retain their 1985 ranking in 1990.

- Increasingly, cross-industry applications will be incorporated in industry-specific applications. This plus the integration of specific vertical modules will increase the average price for a mainframe/mini products.

- From a penetration perspective, in 1985 about $1,750 will be spent per mainframe/mini system for industry-specific software. In 1990, this amount is expected to double per CPU to about $3,000.

(iv) Hot Verticals-Micro

- The industry-specific segment of the micro applications software market will total about $500 million in 1985--or 25% of the overall micro applications market (see Exhibit III-66). With a 43% AAGR from 1985-1990, industry-

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EXHIBIT III-65

MINI/MAINFRAME APPLICATIONS SOFTWARE USER EXPENDITURE FORECAST
BY MARKET SEGMENT, 1985-1990

INDUSTRY SPECIFIC SEGMENTS	1984 ($ Millions)	1984-1985 Growth	1985 ($ Millions)	1990 ($ Millions)	1985-1990 AAGR
Discrete Manufacturing	$586	13%	$661	$1,644	20%
Process Manufacturing	96	27	122	577	36
Transportation	87	28	111	608	41
Utilities	20	10	22	59	22
Telecommunications	30	33	40	208	39
Distribution	215	22	262	999	31
Banking and Finance	674	25	845	2,989	29
Insurance	195	17	228	630	23
Medical	174	45	252	1,365	40
Education	15	13	17	44	21
Services	69	25	86	287	27
Federal Government	14	14	16	41	21
State and Local Government	23	13	26	64	20
Other Industry Specific	50	26	63	235	30
Total	$2,248	22%	$2,751	$9,750	29%

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EXHIBIT III-66

MICROCOMPUTER APPLICATIONS SOFTWARE FORECAST
BY MARKET SEGMENT, 1985-1990

INDUSTRY SPECIFIC SEGMENTS	1984 ($ Millions)	1984-1985 Growth	1985 ($ Millions)	1990 ($ Millions)	1985-1990 AAGR
Discrete Manufacturing	$38	47%	$56	$476	53%
Process Manufacturing	28	36	38	275	49
Transportation	15	40	21	155	49
Utilities	3	33	4	32	52
Telecommunications	5	40	7	52	49
Distribution	57	32	75	441	43
Banking and Finance	76	24	94	477	38
Insurance	46	26	58	282	37
Medical	30	47	44	392	55
Education	32	28	41	161	31
Services	15	60	24	217	55
Federal Government	3	33	4	14	28
State and Local Government	1	100	2	20	58
Other Industry Specific	3	67	5	40	52
Total	$352	34%	$473	$3,034	45%

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specific applications will account for almost 50% of applications software user expenditures in 1990. In 1990, the micro industry-specific market will be greater dollarwise than the whole micro software market in 1985.

- Exhibit III-67 and III-68 show eight "hot" micro vertical segments, so labeled due to steep growth curves. These growth rates must however be put into perspective in that in 1985 the medical market is still only one-eighth the size of the micro word processing market--in 1990 only one-half the size.

B.   MARKET STRUCTURE

1.   FORTUNE 1000 VERSUS SMALL BUSINESSES

- The Fortune 1000 market will have a slow but steady adoption of micros. The installed base in these companies in 1985 will be 1.1 million units, growing to 3.4 million units in 1990. Major companies have stated their commitment to end-user computer literacy, and with over 25 million workers in Fortune 1000 companies (50% of them being white collar workers), the potential for microcomputer hardware and software sales is great.

- The market for micro cross-industry application software sales to the Fortune 1000 is expected to increase at an AAGR of 21% throughout the forecast period (see Exhibit III-69).

    - Leading 1984 products that were sold to the Fortune 1000 are included in Exhibit III-70.

    - Ranked by 1985 sales, the leading products sold to Fortune 1000 customers include:

        . Spreadsheets - $70 million.

        . Word processors - $50 million.

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EXHIBIT III-67

"HOT" VERTICALS
Micro Software User Expenditures
($ Millions)

	$ Millions			Percent
	1984	1985	1990	AAGR
Medical	$30	$44	$392	55%
Services	15	24	217	55
Discrete Manufacturing	38	56	476	54
Transportation	15	21	155	49

EXHIBIT III-68

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"HOT" VERTICALS
Micro Software User Expenditures
($ Millions)

	$ Millions			Percent
	1984	1985	1990	AAGR
Process Manufacturing	$28	$38	$275	48%
Distribution	57	75	441	42
Banking/Finance	76	94	477	39
Insurance	46	58	282	37

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EXHIBIT III-69

FORTUNE 1000 MARKETPLACE
TO GROW STEADILY

Cross-Industry Microcomputer Applications
Software User Expenditures, 1985-1990

AAGR: 21%

$900
800
700
600
500
400
300
200
100
0

User Expenditures
($ Millions)

$330   1985

$840   1990

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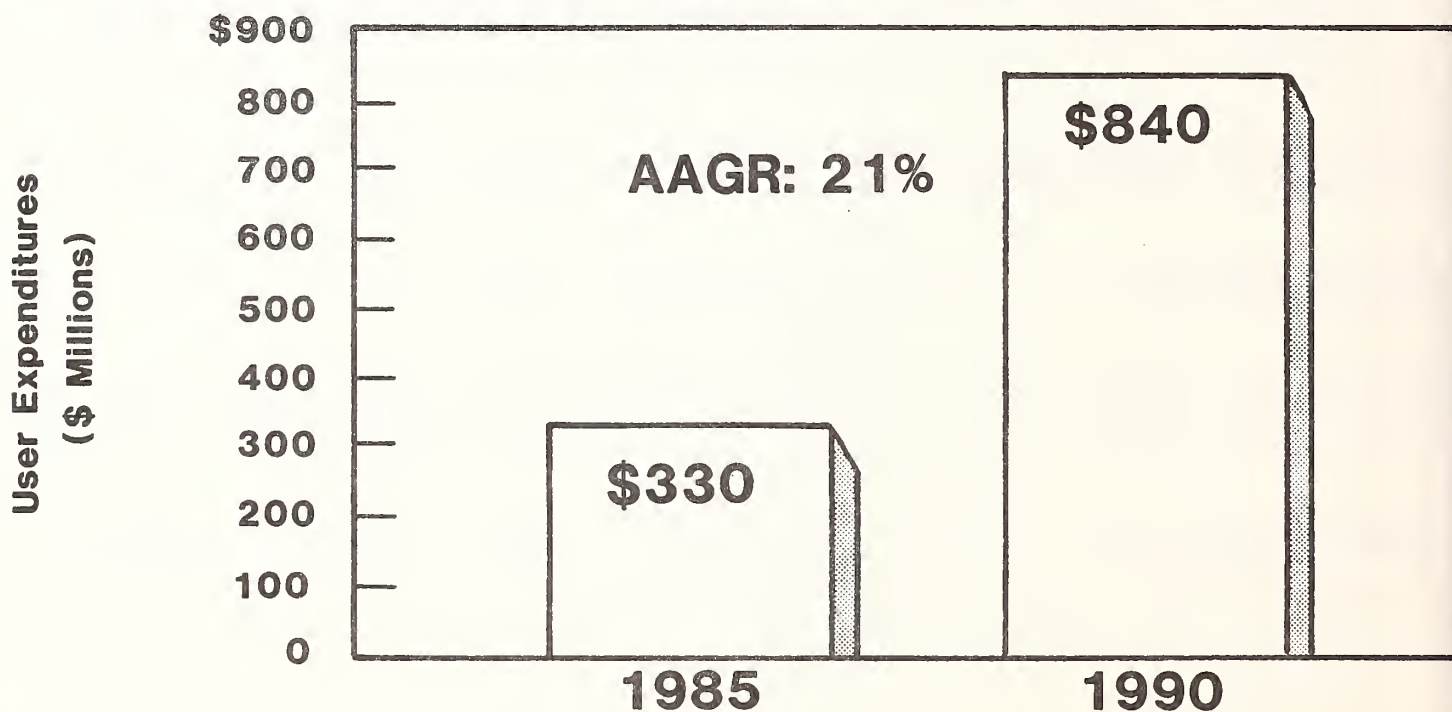
EXHIBIT III-70

LEADING PRODUCTS BY APPLICATION
IN FORTUNE 1000, 1984

CATEGORY	PRODUCT	VENDOR
Word Processing	Displaywrite Series Multimate Wordstar	IBM Multimate International MicroPro
Spreadsheet	Lotus 1-2-3 SuperCalc Multiplan	Lotus Development Corp. Sorcim/IUS Microsoft
Graphics	Chartmaster Energraphics Graphwriter	Decision Resources Enertronics Research Graphics Communications Inc.
DBMS	dBase II, III Dataease Knowledgeman R:BASE 4000	Ashton-Tate Software Solutions Micro Data Base Systems Microrim
Communications	Crosstalk Relay	Microstuf VM Personal Computing

Source: Compilation of INPUT estimates, vendor estimates, Corporate Software Bestseller lists, Softsel Hotlist, and Business Computer Systems Business Bestseller List.

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EXHIBIT III-70 (Cont.)

LEADING PRODUCTS BY APPLICATION
IN FORTUNE 1000, 1984

CATEGORY	PRODUCT	VENDOR
Project Management	Harvard Total Project Manager Advanced Pro-Ject 6 Microsoft Project	Harvard Software Softcorp Microsoft
Accounting	Business Series Accounting Series Accounting Series	BPI Systems Real World Business Software Open Systems
Integrated Software	Symphony Framework Smart Software Enable	Lotus Ashton-Tate Innovative Software The Software Group
Decision Support Systems (DSS)	IFPS/Personal Encore	Execucom Ferox Microsystems
Artificial Intelligence	T.1 Clout Edge Business Software Series	Teknowledge Microrim Human Edge Software

Source: Compilation of INPUT estimates, vendor estimates, Corporate Software Bestseller lists, Softsel Hotlist, and Business Computer Systems Business Bestseller List.

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- Integrated software - $42 million.

- DBMS - $41 million.

- Products with the highest forecast AAGR to the Fortune 1000 include:

    - AI (primarily expert systems and expert system generators) - 72% growth.

    - Communications software - 42% growth.

    - Graphics - 34% growth.

    - DBMS - 30% growth.

- The Fortune 1000 market, through organizations as the Micro Managers Association (MMA) and Technology Assessment through Strategic Cooperation (TASC), has developed the power to significantly influence the overall micro software distribution structure as well as influence software product design (see Chapter IV for additional information on micro software distribution).

    - Due to corporations' desires for volume discounts as well as monitoring training and support costs, increased product standardization will occur in the Fortune 1000 market. Companies will purchase future software products on a select basis from a few well-known, well-positioned vendors with a product line as integrated and compatible as possible,

    - Hard disks are in widespread use in large corporations. Consequently, copy protection schemes that hinder the use of software products on hard disks are being removed largely as a result of pressure from these volume users.

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2.   VENDOR REVENUE GROWTH

   a.   Mainframe/Mini

- In the micro/mainframe area, most major software vendors will have increases in revenue 1984-1985:

   -    Computer Associates = 40%

   -    American Software = 35%

   -    Cullinet = 20-25%

   -    Pansophic = 20%

   -    Software AG = 20%

- The growth, however, in most cases will be less than anticipated, reflecting the 1985 industry slowdown in general.

   b.   Micro

- Most major micro software vendors will experience substantial revenue growth in 1984-1985.

   -    Lotus = 22-35%.

   -    Microsoft = 12-20%.

   -    Ashton-Tate = 25-50%.

   -    Software Publishing = 20%.

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- Multimate = 40%.

- Borland = 30%.

- Microcomputer Division of Computer Associates = 35%.

- Two major vendors with significant decreases in revenue in 1985 are MicroPro (-25%) and Digital Research (-25% to -35%). These vendors are not indications of the industry as a whole. The companies' problems had to do with aging products, scarce resources spread too thin, and the slowness of management in responding to market changes.

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IV ISSUES AND TRENDS (MACRO FACTORS)
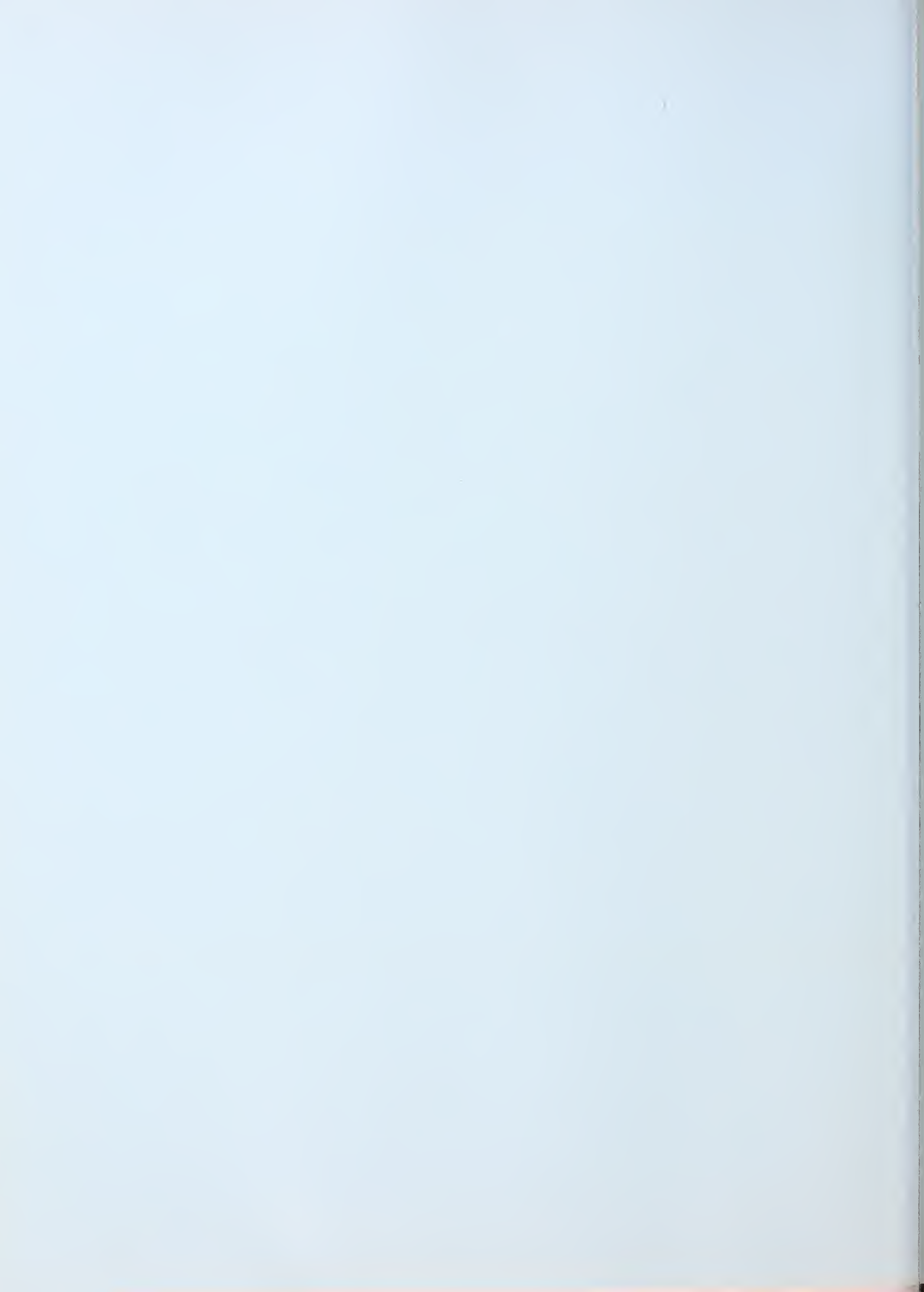
IV ISSUES AND TRENDS (MACRO FACTORS)

A. INFORMATION SYSTEMS ATTITUDES AND EXPECTATIONS

- The following data is extracted from INPUT's 1985 Information Systems Program (ISP) Annual Survey. The data is a compilation of responses from over 150 interviews of IS executives in companies ranging from $200 million to the largest corporations in the country.

- This information reflects the concerns, objectives, and plans of some of the most influential buyers in the nation. Careful study of their responses will help vendors to more carefully attune their market strategy to reflect the changing realities of the marketplace.

1. MAJOR I.S. ISSUES

- Information systems (IS) issues focus on cost and applying technology to solve business problems (see Exhibit IV-1).

  - Although there is considerable publicity about IS being the basis for new products and services, cost is the top strategic issue being addressed by IS. In fact, cost is either the top or second priority issue for all planning periods. This is due to management's perception that IS' major role is to improve productivity and reduce the cost of product and services. The age of IS contributing to revenue has yet to dawn in most industries.

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EXHIBIT IV-1

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MAJOR I.S. ISSUES

Strategic	Tactical	Operational
Cost Containment	Cost Containment	Improve Prod.
Govt. Deregulation	Info. Delivery	Contain Costs
Non-Traditional Competitors	Integrate IS & Corp. Planning	Improve Info. Delivery

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- IS is a technical resource. The challenge to the corporate business strategy is to apply this resource so that the organization will operate more effectively as well as more efficiently. In the next three years, two areas will be the center of this activity:

  - Information distribution both internally and to customers will provide the potential for product differentiation and exploitation of market information.

  - The information structures in many industries are being redesigned to be customer oriented instead of product, application, and function oriented.

- The changing regulatory environment is having a profound effect on the competitive nature of many industries. Barriers of entry are being lowered, and a means for quick and profitable entry into these markets is flexible and responsive information systems. The success and survival of many companies will depend on the effectiveness of IS.

2. I.S.' CHANGING ROLE

- In the past, management has viewed IS solely as an operational resource. IS had little input into the corporate planning process, and systems were developed primarily to increase control and improve efficiency of back office activities. IS reported to the finance organization which perpetuated IS' role as an extension of the accounting department.

- IS' role has changed. Management is realizing the advantage of using systems to aid decision making. The end-user revolution has spawned a new, large group of powerful users: middle management. The increased visibility of IS has moved it from a purely operational department to a support and service organization. IS usually reports to an administrative executive and is begin-

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ning to contribute to the corporate planning and product development process (see Exhibit IV-2).

- In the next five years, IS will have a more strategic role. It will report to a senior executive and will become an integral part of the corporate planning process. IS will become more consultive, advising senior management on corporate direction based on information systems technologies. IS will become a service organization. This will require business as well as technical skills. IS will have a vital role in applying technology to corporate strategies to ensure the success of the organization in the 1990s and beyond.

3. IMPACT OF TECHNOLOGY

- The impact of technology is summarized in Exhibits IV-3 and IV-4.

- End-user computing is having a major impact in many firms. The explosive growth of microcomputers, the growing support and training needs, and the use of decision support systems have put resource demands on IS. In the near term, IS is establishing service-oriented, end-user support organizations. In the longer term, IS will define end-user needs and incorporate them in IS and corporate strategic plans.

- Part of the long-range end-user plans may include the use of departmental processors and distributed systems development. Many respondents believe that departmental processing will be the ultimate catalyst for moving end users from spreadsheets to integrated systems. In the near term, IS is looking toward micro-to-mainframe applications as a way of satisfying departmental processing demands. The micro portion of these systems, distributed systems development (DSD), may be remotely developed by end users and business analysts in the near future.

- Merging voice and data communications holds great potential for containing the mushrooming communications cost. However, most respondents are

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EXHIBIT IV-2

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I.S.' ROLE IS CHANGING

View: Operational ⟶ Strategic

Reporting: Finance ⟶ COO

Planning: None ⟶ Peer Contributor

Function: Technician ⟶ Consultant

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EXHIBIT IV-3

IMPACT OF TECHNOLOGY

	IMMEDIATE	NEAR TERM	LONG-TERM
End-User Computing	(High)	Medium	Medium
Departmental Processing	Low	Low	(High)
Distributed Systems Development	Low	Medium	Medium

EXHIBIT IV-4

IMPACT OF TECHNOLOGY

	IMMEDIATE	NEAR TERM	LONG-TERM
Voice/Data Integration	Low	Low	Medium/ High
LAN	Low	Low	Low

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skeptical about whether the technology will exist to make merging voice and data a reality. The respondents believe, however, that the support of both voice and data should be merged. Fifty-nine percent of the respondents have merged these organizations, usually as a part of the IS department.

4.   I.S. BUDGET GROWTH WILL REMAIN THE SAME

- IS budget growth will remain at about 10% in 1986. The major growth areas will be processors, storage devices, and data communications. The smaller growth areas will be outside processing and professional services (see Exhibit IV-5).

  - The demand to improve information delivery is fueling the demand for more processing power, better networks, and more accessible, better organized data bases.

  - The dampened demand for outside processing is reflective of management's desire to process information internally. Professional services are being used for specific problem resolution as opposed to general-purpose consulting. Professional services are viewed as a discretionary, deferable expenditure by many organizations.

- Eighty-four percent of the respondents are planning to increase their IS budgets in 1986, but 50% plan to increase their budgets at a lower rate than in 1985. Hardware, personnel expenses, and software acquisitions are the primary contributors to increasing IS budgets. Factors that are decreasing budgets include staff reductions, improved hardware efficiency, and improved productivity.

- IS budgets have the same dependence on corporate revenues and profit as other departments in the enterprise. The services sector's IS budget has the greatest dependence and the process manufacturing and transportation sectors' budgets have the least dependence on corporate revenues.

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EXHIBIT IV-5

I.S. BUDGET GROWTH WILL REMAIN THE SAME

Budget Growth

Budget Growth	
1984-1985	10.0%
1985-1986	10.2%

0   5   10   15%
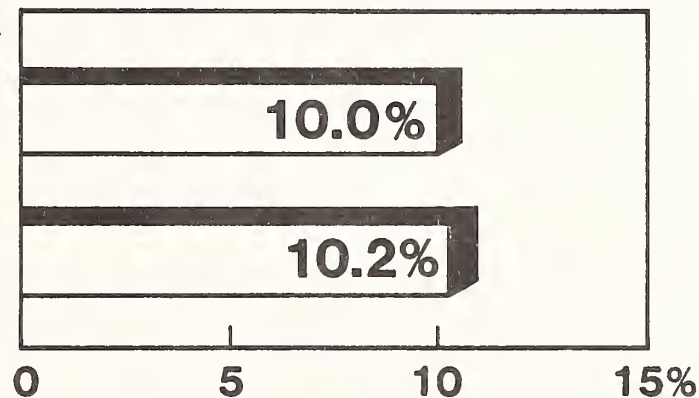
Factors Increasing Budget	Factors Decreasing Budget
Hardware	Staff Reduction
Personnel	Improved HW Efficiency
Software	Improved Productivity

5.   I.S. BUDGET DISTRIBUTION

- The distribution of the 1985 IS expenditures remained essentially the same as in 1984. Personnel and hardware expenses account for over three quarters of the IS budget. Data communications is planned to grow at 11% in 1986, and many respondents are focusing on controlling costs of this category. Sixty-six percent of major software development is planned to be done entirely by internal personnel. This has kept external software expenditures at 7% of budget, with a relatively low growth rate of 5% in 1986 (see Exhibit IV-6).

- Seventy-seven percent of corporate information systems spending is controlled by IS.

  - Seventy-one percent of corporate and 92% of IS budgets are spent on centralized computing. In 1986, this is projected to become 68% corporate wide and 90% for IS.

  - Twenty percent of corporate computing expenditures will be for distributed processing. This will grow slightly to 21% in 1986. Distributed processing will decrease slightly in the IS budget, from 5% in 1985 to 4% in 1986.

  - End-user computing will grow. Corporate wide, it will grow from 9% in 1985 to 11% in 1986. For IS, it will double, growing from 3% of the IS budget in 1985 to 6% in 1986. Most of this growth will come from central IS resources.

6.   I.S. IMPACT ON COMPETITIVE POSITION

- IS budgets are only moderately dependent on revenues. Although management is concerned with costs, they are also aware that information systems may enhance the firm's competitive advantage (see Exhibit IV-7).

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EXHIBIT IV-6

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I.S. BUDGET DISTRIBUTION

1985

Personnel 42%

Other 8%

SW 7%

Data Comm. 9%

Hardware 34%
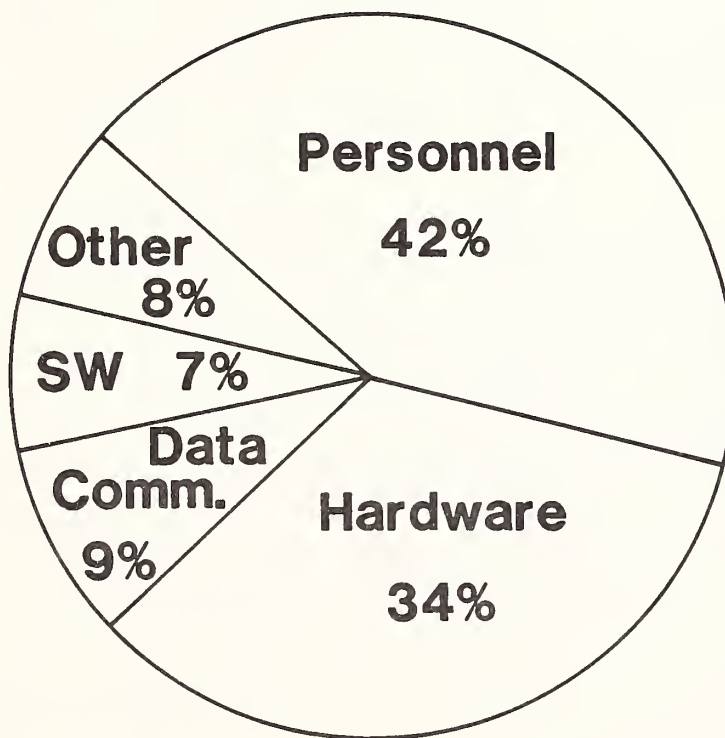
Percent of IS Budget

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EXHIBIT IV-7

I.S. IMPACT ON COMPETITIVE POSITION
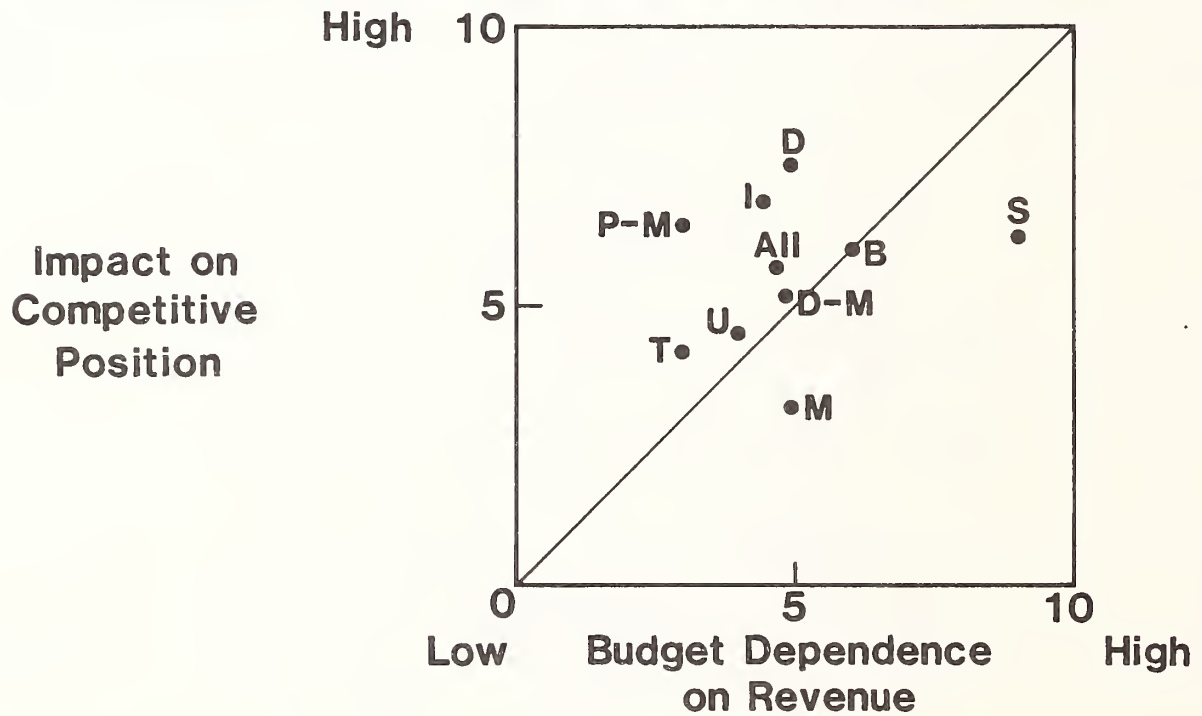
All – All Industries

B – Banking & Finance

D-M – Discrete Manufacturing

P-M – Process Manufacturing

I – Insurance

D – Distribution

U – Utilities

T – Transportation

S – Services

M – Medical & Health Care

- The respondents were asked to rate the dependence of their IS budget on revenues, and only the services sector rated their budget as being highly dependent upon corporate revenues. No sector's IS budget had a high dependence on corporate profit.

- The respondents were also asked to rate management's perception of the relationship between investing in IS and the company's competitive position.

  - Distribution and insurance respondents indicated there is a high relationship between the investment in IS and the company's competitive position. No sector's respondents indicated there was a low relationship.

  - Only the medical and services industries rated the expected effect of IS on competitive position as lower than the dependence of IS budgets on corporate revenues. This indicates that most respondents' management believe that IS has the potential for enhancing the company's competitive position and that the investment on IS should be more dependent on strategic need than current revenues. However, many companies still are limiting IS investments due to corporate cost constraints. When, or if, these constraints are lifted, IS should see its budgets increase at a faster rate.

- IS budgets will grow at about the same rate in 1986 as in 1985. Approximately three quarters of the corporate IS expenditures will be controlled by the corporate IS organization. Exhibit IV-8 and IV-9 show the distribution of the corporation's IS spending in 1985 and projected for 1986.

  - Central IS expenditures will reduce slightly in favor of end-user computing.

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EXHIBIT IV-8

DISTRIBUTION OF I.S. EXPENSES

1985

EXHIBIT IV-9
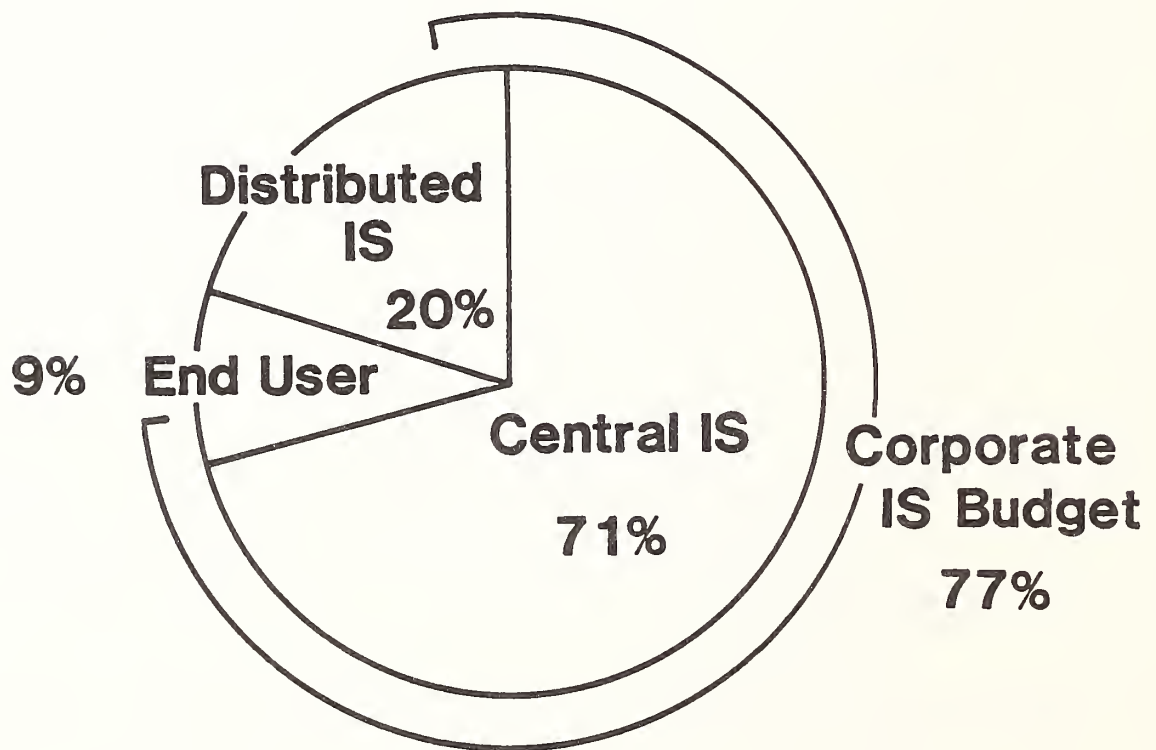
PROJECTED DISTRIBUTION OF I.S. EXPENSES
1986
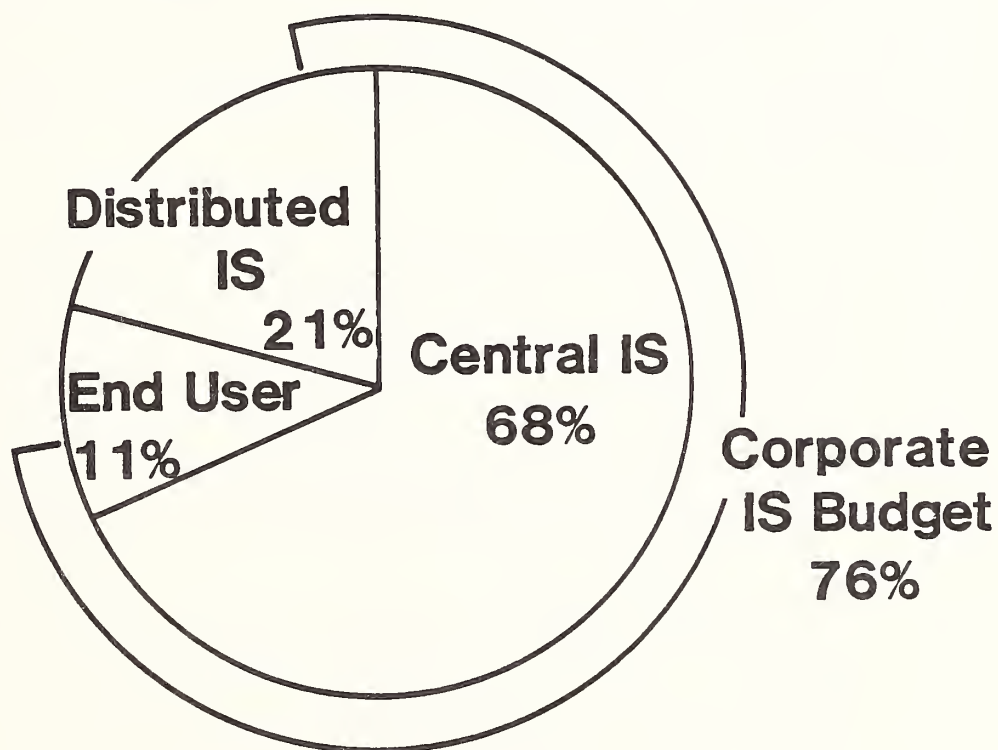
- The corporate IS department will control about the same portion of IS expenditures. In 1985, 5% of corporte IS budget will be allocated to distributed computing and 3% to end-user computing. In 1986, it is projected that 4% of the corporate IS budget will be allocated to distributed computing and 6% to end-user computing.

7.   BUDGET ANALYSIS

- IS budget growth rates will continue to grow at 10%. The distribution among budget categories has not changed markedly over the past five years. Exhibit IV-10 shows the 1985 budget distribution and projects the growth of budget categories for 1986.

    - The largest projected growth areas are processors, storage devices (i.e., DASD), and telecommunications. The need to improve information delivery internally and to customers is fueling the demand for these budget categories. The restructuring of data bases to become more customer oriented and integrated among function, products, and applications is increasing the demand for more mainframe storage.

    - The smallest growth areas are outside processing and professional services. There is a continuing trend to reduce outside processing whenever possible. The only growth area is the use of public data bases by end users. Professional services is primarily viewed as a discretionary item. The use of professional services is being limited to assistance on specific problem areas.

- Eighty-four percent of the respondent IS organizations are planning to increase their budget in 1986, but half of these institutions are planning for lower growth rates than 1985.

    - Factors contributing to increasing the IS budget include (in order of most frequently mentioned factors):

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EXHIBIT IV-10

1985 BUDGET DISTRIBUTION AND 1985/1986 CHANGES

BUDGET CATEGORY	1985 PERCENT OF I.S. BUDGET	1985-1986 EXPECTED BUDGET GROWTH
Personnel Salaries and Fringes	41.6%	7.4%
Mainframe Processors	10.9	10.0
Minicomputers	2.7	11.5
Microcomputers	2.1	10.0
Mass Storage Devices	5.8	10.5
Other Hardware	7.2	6.9
Total Hardware	28.7%	9.5%
Data Communications	9.3%	11.0%
External Software	4.5	5.0
Professional Services	2.6	0.9
Turnkey Systems	0.8	2.6
Software Maintenance	1.2	5.0
Hardware Maintenance	5.8	5.1
Outside Processing Services	1.4	0.0
Other	4.1	3.0
Total	100.0%	10.2%

INPUT
UCIS MSAS

- Hardware.

- Personnel expense.

- Software.

- Inflation.

- Office systems.

- Data communications.

- Factors contributing to decreasing the IS budget include (in order of most frequently mentioned factors):

  - Staff reductions.

  - Improved hardware efficiency.

  - Improved productivity.

  - Improved software.

- IS budgets are moderately dependent on corporate revenue and profit. Only the service industry has a high dependence between IS budgets and corporate revenue. This is because many of the service companies market IS as a product. The highest dependence on profit is in the medical and health care industry. This industry looks for discretionary funds to invest in IS.

INPU

B. IMPACT OF TECHNOLOGY

I. OVERALL

- Constant improvements in technology are a major driving force in the software market. They lead to:

    - More powerful hardware at decreased cost (which will increase the availability of computers, especially micros).

    - More sophisticated hardware which will lead to better, easier to use software.

    - A wave of new products, new markets, and new types of software solutions.

2. PROCESSORS

- In the high end micro area, more powerful processors such as the Intel 80386 and the Motorola 68020 will provide greater speed and better memory management.

    - Hardware designed around these chips will impinge directly on sales of traditional minicomputers.

    - This greater processing power will in turn stimulate the development of new software.

3. OPTICAL MEMORIES

- Optical memories have the cost, capacity, and performance characteristics that are necessary to effect substantial changes in data base management.

INPUT

- It is not necessary to wait for erasable drives to make imaginative use of the technology.

- As it now exists, optical disks can be extremely valuable for archival storage (magnetic tape and micrographics replacement), electronic filing (image processing), and supplementing magnetic disk storage.

- New data base software will be needed to maximize the use of these products.

4. DATA BASE MACHINES

- Data base machines are beginning to appear as alternatives to general purpose processors with conventional DBMS software. While the impact on the DBMS market has not been great up to this point, the recognition of the central host as being fundamentally a data base machine will increase the competitive pressure on conventional DBMS products. (There are already reports of data base machines handling an IBM 3084 workload at one-tenth the cost.) These hardware-oriented systems will require new types of DBMS software to best optimize their performance.

5. ARTIFICIAL INTELLIGENCE (AI)

- Artificial intelligence refers to the study of the processes in which humans perceive and assimilate data (and use reasoning to process this data) for the purpose of duplicating these processes within computer systems. AI also refers to the computer systems that accomplish these processes.

- The major AI categories that affect software development and sales are:

  - Natural language systems.

  - Expert systems.

INP

- Speech understanding systems.

- Symbolic and logic programming languages.

● Definitons are as follows:

  - Natural language systems (e.g., INTELLECT, EASYTALK) receive as input typed natural language statements and translate these statements into a command syntax that the computer can understand.

  - Expert systems applications (e.g., MYCIN, DENDRAL) contain specialized factual and heuristic knowledge. When inquiries are made by end users, this knowledge is used to make logical deductions for responding.

  - Symbolic programming languages (e.g., LISP) manipulate symbols and handle strings of information. In addition to being useful for solving algebra problems, these products are useful for parsing natural languages in AI.

  - Logic programming languages (e.g., PROLOG) are designed for programming that uses a large amount of logical operations in programming data. These languages are useful handling rule-based applications like expert systems.

● The first three types of AI are directly involved with supporting the end user either with ease of use or ease of access.

● The last category of products are used primarily by programmers in developing more sophisticated software.

● INPUT estimatesthat the AI software market will grow from $20 million in 1985 to almost $200 million in 1990 for an AAGR of 58%.

INPUT

- Factors positively impacting the AI market growth include:

    - Japanese "Fifth Generation" project perceived as a threat to the U.S. high tech industry.

    - Decreasing hardware price/performance ratio of supermicros that makes it more economically feasible to develop AI applications.

    - High Department of Defense interest in funding AI projects.

    - AI gaining recognition in certain vertical markets as a competitive weapon for managing information. In particular, banking, insurance, and manufacturing segments are funding the development of expert systems for this reason.

- Negative AI growth factors include:

    - User confusion as to "what is AI and how can it be used?"

    - Despite the fact that expert system generators are now available, the cost of purchasing let alone maintaining these systems is high. Packages that may be used by only a select few within an organization can run as high as $80,000 for software alone, with another $30,000 for a single user workstation.

C.   MARKET STRATEGY

1.   PRICING

- The price at which a software product sells is the net result of the complex interaction of hundreds of factors. They range from logical vendor control-

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lable considerations such as product features, to support, to emotionally based buyer perceptions of companies, products, or people.

- The seller's continual economic survival depends upon accurate pricing. Selection of the right product price that will optimally balance buyer interest with vendor income requirements is one of the most challenging management functions.

    a.   Profile of Revenue Sources, 1990 Mainframe/Mini

- In 1984, an average software product vendor received revenue from a variety of sources.

    -    Twenty percent maintenance.

    -    Thirty percent lease.

    -    Fifty percent procurements.

- Due to increase in the installed base of software products, the maintenance portion of revenue as well as revenue from leasing are expected to increase. In 1990, INPUT expects a typical vendor's revenue source to be divided thusly:

    -    Twenty-five percent maintenance revenue.

    -    Forty percent lease (month to month).

    -    Thirty-five percent new procurements.

- The types of payment plans for the licensing of software products that companies offer in many ways directly impact a company's annual revenue, and thus its business options.

INPUT

- The three major types of payment plans are:

  - Lump sum (the entire license fee is paid within five months or less of the signing of the contract). The user typically has the right to use the product for up to 99 years thereafter.

  - Installment plan (the license fee is paid over a period of from six months to several years, usually not more than three years). After the payment of the final installment, the user has the right to continue to use the product without further payment, except for optional software support.

  - Lease or rental plan (the user pays a periodic license fee, usually monthly). Whenever the payments cease, the software must be returned to the vendor unless the buyer converts to a lump sum or installment plan.

- Considering this data, INPUT expects that in 1990, of the $30 billion in mainframe/mini software product that is expected to be shipped (e.g., new procurements), 20% of it will be by lump sum payment and 80% will be on some type of month-to-month payment plan.

- The cause of this change in purchase behavior will be primarily due to an increasing number of sales that will be made to end-user departments within companies rather than a central IS department. These departments will have in general restricted budgets and will be less able to pay via lump sum.

- Implications to vendors are:

  - Vendors will need more money to penetrate a market, and vendors will also need to find sources to finance customers.

- With month-to-month payment plans, short-term revenue is deferred, but after a few years monthly revenues will produce a stable revenue stream. This tends to favor large established vendors that can afford to "wait out" the initial time needed to make month-to-month payments profitable.

- According to a recent INPUT survey, in 1984 almost 60% of all respondents received payment by lump sum, 8% by installments, and 33% by lease rentals.

b.   Mainframe/Mini Pricing

- Pricing as a central element in a well-conceived mainframe/mini software product marketing strategy has not yet reached its full potential.

    - Recent discounting, although only temporary, reflects management's reaction to present market pressures.

    - Software product vendors for the most part have been lacking in creative pricing innovations.

- Although software product prices experienced a lower than expected growth rate over the past two years, INPUT expects that price levels for software products in general will increase over the next two years (see Exhibit IV-11).

    - Discrete manufacturing is expected to have the highest pricing level change (about 10%). This will be due primarily to:

        . Increased user demand.

        . Management focusing again on company long-term strategy that will lessen price discounting.

INPUT

EXHIBIT IV-11

PRICES VOLATILE, BUT TREND IS UP
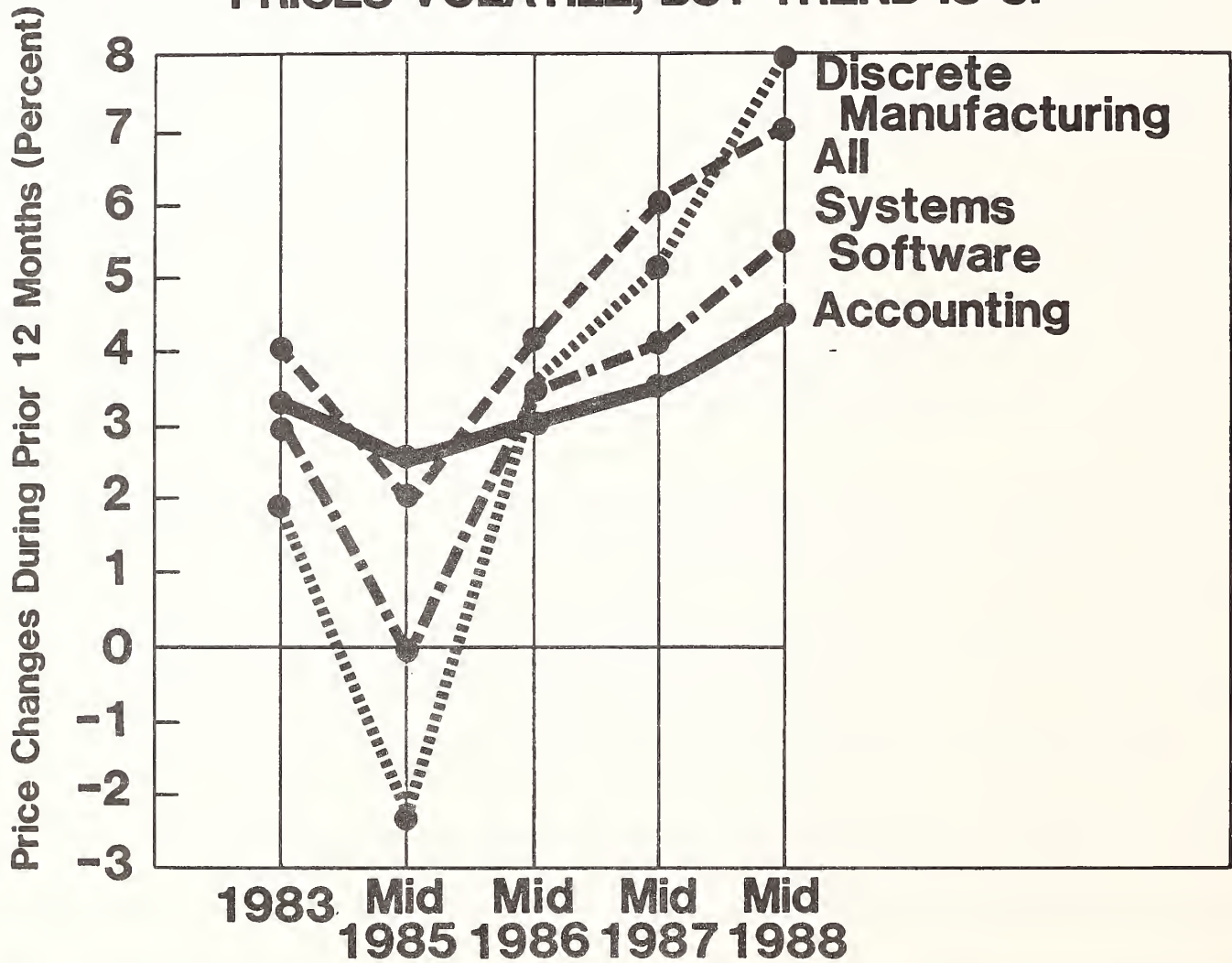
- The accounting market will experience between a 3-5% pricing increase due to the large replacement market for systems that are 10 to 20 years old.

- The systems software product pricing increase is similar to the accounting market. End-user computing is one of the driving forces in this market whereby the solutions will be more important than price in the purchase decision.

● Vendors are urged to give pricing a more central role in the overall marketing strategy. Pricing should be given the image of a teamwork decision process instead of a corporate fiat. This can be accomplished by:

- Educating key personnel concerning the payoffs from improved pricing approaches.

- Keeping them aware of market changes that can be affected by a pricing change.

- Encouraging the contribution of new ideas.

c.   Micro Pricing

● Pricing for similar micro products spans the range of under $100 to over $500. Pricing consequently is a major source of confusion for new as well as sophisticated software purchasers.

● In the Fortune 1000 market where pricing is not as major an issue as for a smaller business, the purchase of well-known, higher-priced products with additional features and capabilities will still continue. Corporations, however, will attempt to receive the best price on these products by site licensing or through mail order purchasing.

INPUT

- Networked and multiuser products will tend to keep the average price of micro software stable in spite of the popularity of quality products as those from Borland International that sell in general for under $100.

- As with the sale of all types of software products, more important than price to the end user are product performance, ease of use, and vendor financial stability and name recognition.

2. CUSTOMER SERVICE AND SUPPORT

   a. <u>Service as an Opportunity</u>

- Support includes:

   - Hotline inquiry.

   - Enhancements.

   - Fixes.

   - Right to upgrade at a decreased price.

      (i) Mainframe/Mini

- Large system software service and maintenance opportunities are growing very rapidly due to demand by users for improved services. Currently, over 80% of large system software users are performing some type of software support internally since external support from the vendor for certain types of software is not available or does not meet user requirements.

INP

- User attitudes are elaborated below:

    - In a recent INPUT survey on pricing, most responding users were satisfied with the pricing of a vendor's support services (see Exhibit IV-12). Sixty percent of the systems software users and 67% of the applications software users felt that prices were acceptable.

    - Interestingly, 38% of the respondents also indicated that they would be willing to increase their software support expenditures if the support services were expanded to truly support users' current and future needs.

    - Consequently, vendors have the opportunity to increase revenue as well as customer satisfaction by increasing support services.

        (ii)   Micro

- Software support will become an increasingly important revenue stream for both microcomputer software vendors and VARs.

- From a recent INPUT survey, it was determined that in 1985 support for micro products averages 27% the retail price of a vendor's software package. In other words, if a product sells for $200, a vendor would charge an average $54 per year for support (see Exhibit IV-13).

- Users are very interested in support. Thus, it is a significant opportunity for vendors during the next five years.

    - In 1985, of vendors interviewed that provided support, 17% of their total revenue was due to support. In other words, a company earning $10 million in revenue would have $1.7 million of that revenue from support charges.

INPUT

EXHIBIT IV-12

USER ATTITUDES TO PRICING

Applications

40%   60%

38%

13%   25%

Systems

33%   67%

38%

8%   30%

0   20   40   60   80   100%

Percent of Users

◻ Prices are too high.   ▨ Prices are just right.

▨ Would pay more for better support.

EXHIBIT IV-13

INPUT®
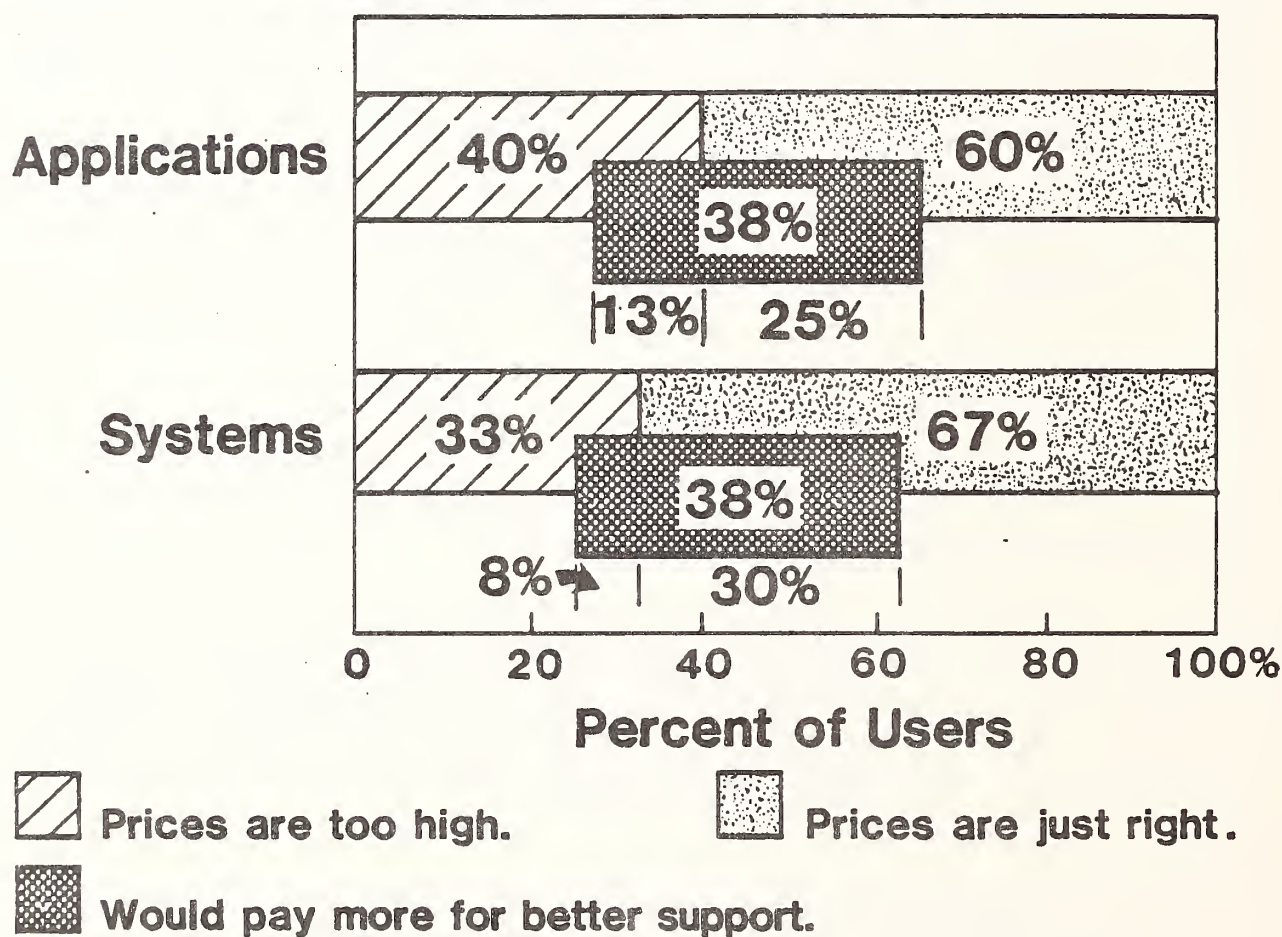
SOFTWARE PRODUCT SUPPORT

- Support Averages 27% of Retail Price
- Revenue Stream Increasingly Significant

| 1985 | 17% |
| 1990 | 22% |

0   5   10   15   20   25%

Percent of Vendor Revenue
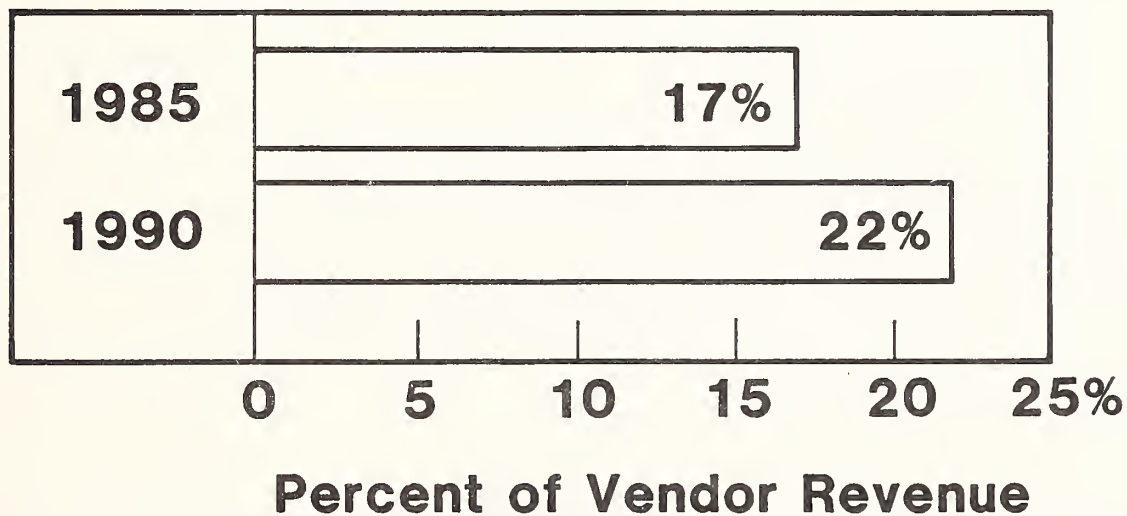
- But 37% of Users Dissatisfied with Support

INPUT
17AMKTCOM85
MSA5

- As the installed base of packages increases, support revenue, too, will increase.

- In 1990, 22% of vendor revenue is expected to be support related.

- But--the caveat and the challenge--vendors will not reach this 22% 1990 support revenue potential if users are dissatisfied. In 1985, 37% of a sample of users expressed dissatisfaction with support, especially hotlines and fixes. Thus, opportunity exists, but only if vendors respond with truly value-added support.

b.   Consulting

- Support can come in forms of:

    - Conversion (old data to new).

    - Training (how to use the system).

    - Maintenance.

    - More importantly, consulting with the customer as to how to make the system a success in that particular customer's environment. For example, when installing a general ledger package, consulting with the customer as to how it fits with an existing financial modeling package (or with other software systems the customer may already have installed) can be a highly prized service.

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3.   DISTRIBUTION

   a.   <u>Mainframe/Mini</u>

● Mainframe software products have primarily been sold through direct sales; mini products through hardware vendors and VARs.

● Software product vendors will increasingly seek alternative distribution channels as a way of controlling their heavy marketing and sales expenses.

● New distribution channel opportunities will exist in the future, such as:

   -    Using customers to (re)sell systems (as a bank selling a software vendor's cash management package to large corporate clients).

   -    Selling the software product to either hardware or software product vendors to be imbedded in their products--examples are Oracle selling its data base package to hardware vendors and ADR selling their DATACOM/DB to applications software vendors for a more integrated product line.

   -    Software product vendors participating as subcontractors to system integration vendors such as EDS.

   -    And finally, and many ways one of the most intriguing distribution opportunities for software vendors in the future, licensing a product to IBM. Examples of this include UCCEL's licensing of UCC TWO (DUO) to IBM after marketing it by themselves for over a decade, or IBM's marketing of CADAM or INTELLECT.

INPUT

b.   Micro

- INPUT forecasts that there will be a major shift in market share for several channels during 1985-1990 (see Exhibit IV-14).

    - Dealers were the first major software distributors, but other channels have emerged or grown competing for revenue money.

        . With increased competition, dealer market share is expected to half in 1990 from 53% to 22%.

        . End-user software expenditures through this channel will double, however.

    - User expenditure through VARs will increase 10 times, making their market share close to dealers in 1990. This will be due primarily to the large increase in industry-specific software sales.

    - The other growth area is direct sales. This segment is expected to increase dramatically, especially with the acceptance of site licensing and volume discounts.

        . Although many vendors have recently adopted a site licensing policy, few have been actually sold.

        . Presently, site licensing confuses the marketplace and slows the sales effort due to inconsistent pricing policies.

        . Lesser well-known micro vendors have been most active in promoting site licensing. These companies have limited advertising budgets and inadequate distribution networks; consequently, they have the most to gain from these arrangements.

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INP

EXHIBIT IV-14

MICROCOMPUTER SOFTWARE SALES
TO U.S. BUSINESSES

Distribution Channel	1984		1990	
	%	$M	%	$M
Computer Retail	53%	$1,170	22%	$2,400
Mail Order	20	440	40	4,300
VAR	10	220	20	2,200
Software Only	5	110	3	300
Direct	2	44	10	1,100
Other	10	220	5	500
Total	100%	$2.2B	100%	$10.8B

- In contrast, major micro software companies fear site licensing would disrupt their existing distribution channels and pricing structures. These vendors in the near future will most likely offer site licensing in the form of volume discounts serviced in many cases by major local software dealers.

INPU

V COMPETITIVE DEVELOPMENTS

V COMPETITIVE DEVELOPMENTS

A. ACQUISITION TRENDS

1. OVERVIEW

- Over the past decade the rate of acquisitions in all types of industries has decreased yearly. During the same period, the rate of mergers and acquisitions in the information services industry has steadily risen.

- Principal among the companies targeted for acquisitions in the past four years have been software companies. In 1984, 57% of all information services company transactions have been these companies (see Exhibit V-1). Note: the number of transactions is used as a yardstick to avoid the enormous impact of the GM/EDS purchase on the percentages by value.

- Software product acquisitons are likely to remain strong. This is due to the wide variety of opportunities in the overall software product market as well as the possibility for profit margins higher than in most industries.

- Acquisitions do not, however, necessarily contribute to the growth of the overall information services industry revenue and profits. It can be argued that they detract from it in the short term, in many cases due to the management energy required to coordinate the product lines and restructure the organization at all levels after the acquisition. In the long term, the

INPUT

EXHIBIT V-1

SOFTWARE COMPANIES TAKE CENTER STAGE WITH ACQUISITIONS

DELIVERY MODE	PERCENT					
	1982		1983		1984	
	#	$	#	$	#	$
Processing Services	47%	53%	30%	44%	36%	80%
Professional Services	7	6	10	2	7	1
Software Products	46	41	60	54	57	19

Source: Broadview Associates

acquisition can be expected to have a positive effect on the industry by concentrating resources in the hands of a quality, forward-looking management team.

- Examples of several significant 1985 software product company acquisitions follow:

2.   ADR

- In late 1985, Ameritech, one of the seven regional telecommunications holding companies spun off from AT&T, initiated a tender offer to acquire well-known mainframe systems software vendor, Applied Data Research (ADR), at a cost of over $200 million in cash. The transaction is the largest to occur in the software industry.

- The main advantage to ADR of this acquisiton is the added revenue stream for increasing R&D efforts that Ameritech can provide. As the DBMS market continues to increase in competitiveness (primarily due to IBM), product improvements and enhancements are becoming increasingly important.

- Benefits to Ameritech include:

  -    A competitive edge in the software marketplace for ADR product as well as internally developed Ameritech product distribution.

  -    The ability to leverage off of ADR's system software expertise to develop new products for in-house use as well as products for commercial sales.

3.   MULTIMATE

- In July of 1985, Ashton-Tate stated its intention to acquire Multimate, a major micro word processing product vendor, for $19 million. This acquisiton was the largest in the micro software industry.

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INPUT

- By this acquisition, Ashton-Tate now has strong product offerings in two of the three micro software categories: DBMS and word processing. The third major category, financial modeling, is dominated by Lotus.

4. BORLAND AND ANALYTICA

- In October 1985, Borland International, the innovative-pricing micro software vendor, acquired Analytica, a two-year vendor of Reflex, a micro DBMS product.

- Prior to the acquisiton, sales of the product had been slow. Immediately after the acquisition, Relex's price was dropped from $495 to $99 and reportedly sales have increased dramatically.

- In the near future, Borland plans to introduce add-on software products for Reflex—most likely templates that would be targeted toward specific markets or industries.

5. LOTUS

- In 1984, Lotus Development Corporation, the leading micro software vendor, acquired Software Arts, the developer of VisiCalc. This was one of the first of several joint ventures or acquisitions that the company has made since then.

- One of the most recent, in December 1985, was the acquisition of a small company called GNP Software which makes a product named HAL that interfaces with Lotus 1-2-3. HAL is a low cost natural language interface that greatly simplifies the common command structure for 1-2-3. This acquisition saves Lotus time and money in developing a similar product and can add value to Lotus present and future product offerings.

INP

6.   STERLING AND INFORMATICS

- In June 1985, after two rejected buyout bids, Informatics General, a leading mainframe software vendor, agreed to be acquired by Sterling Software, a holding company for software product firms.

- The company was acquired for $126 million or $27 a share.

- The acquisition does not help Sterling dominate any one market since the companies' product lines do not overlap, but it does help Sterling expand the number of nitch markets in which it is involved. The new segments that Informatics products will add to Sterling are law and accounting--the company already services the banking industry.

- Sterling also acquires an increased market presence with an established sales force and offices that will aid in expanding their distribution network for Informatics as well as Sterling product lines.

- With the addition of such a large company to their base, Sterling has the advantage of economies of scale whereby the company can decrease the marketing and sales expense per unit sold.

- Another opportunity for Sterling is the possibility of increasing revenue of Informatics simply by implementing a different, more aggressive approach to management.

INPUT

B.   STRATEGIC PARTNERING

1.   OVERVIEW

- As the pace of technology increases, software vendors are both positively and, more often than not, negatively affected. Shorter product life cycles translate into higher front-end costs for developing markets and shorter payback periods in which to recover investments.

- This fact about the industry, as well as the realization by both large and small companies that they cannot specialize in every facet of the businesses they have chosen, has lead to a new cooperative concept among companies called strategic partnering.

    - In this agreement, separate legal entities are assigned a role within the overall strategic plan of a given vendor.

    - The purpose of this partnering is to give the vendor additional capabilities and resources that are needed to have a more significant impact on the overall marketplace than the vendor could do alone.

- The most significant examples of strategic partnering involve some of the largest concerns in the computer industry as opposed to small, under-resourced concerns.

- Two examples of vendors with strategic partnering in the software industry are as follows.

2.   IBM

- IBM, given its size and unparalled resources, might seem able to fulfill all of its developmental and sales requirements with its own products and staff.

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However, the company has been increasingly active in promoting partnerships and license agreements with both large and small companies that can assist with their overall goal of dramatically increasing their share of 1990 worldwide revenue that is derived from software sales.

- In 1984, IBM acquired about a 20% interest in Intel, a major designer of semiconductors. This arrangement has positively impacted IBM's ability to produce microcomputers built on Intel chips as well as use the chips as the foundation in creating operating systems for smaller systems.

- In late 1984, IBM entered an agreement with Interactive Systems Corporation, Santa Monica (CA) to sell a version of UNIX for the IBM PC called PC/IX. In 1985, IBM announced UNIX V for its Sierra mainframes that run as a guest under VM. The product was developed largely by IBM but with some components of Interactive Corporation's IS/3.

- In 1985, IBM and Microsoft announced a joint venture in the area of operating system development. This agreement is of major significance to both users and software developers in the micro software arena.

  - There has been a fear that IBM will take their up to now open architecture operating system (PC-DOS), developed by Microsoft, in house and create a proprietary operating system for future products as with IBM larger systems.

  - This relationship in many ways assures the continuing of open architecture, at least short-term.

- IBM has licensed and is the sole U.S. distributor of CADAM, a discrete manufacturing product developed by a company by the same name in Southern California.

INPUT

- Another way to increase software revenues is through distributing other vendors' products. In its product center computer retail stores, IBM distributes and sometimes private labels other vendors' popular products as well as its own internally designed packages.

3.   AT&T

- Since its deregulation beginning January 1984, AT&T has moved aggressively into the overall information services industry. Initially, their product strategy evolved around the UNIX operating system that was developed by Bell Labs. In 1985, due to market pressure, the company chose to accept the micro-computer industry standard operating system MS-DOS and develop IBM PC-compatible products.

- AT&T, however, has formed some strategic alliances with software vendors, mainly in the UNIX area.

    - In 1984, AT&T and Digital Research entered into an agreement to develop tools and applications software for the UNIX operating system. In 1985, this arrangement was discontinued.

    - AT&T, however, has licensed GEM, the operating environment from DRI that would provide UNIX products with an easy-to-use user interface.

    - AT&T has a large number of VAR agreements for selctive vertical market packages that run on AT&T hardware, primarily on UNIX-based systems.

    - Of major significance in 1985 is the joint arrangement between EDS and AT&T in which both vendors are working on providing connectivity solutions in the office environment no matter what brand of hardware or software is being used.

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- On balance, strategic partnering will continue to play a major role in the future of the software product marketplace.

INPUT

APPENDIX A: DEFINITIONS

APPENDIX A: DEFINITIONS

- INFORMATION SERVICES--Computer-related services involving one or more of the following:

    - Processing of computer-based applications using vendor computers (called "processing services").

    - Services that assist users in performing functions on their own computers or vendor computers (called "software products" and/or "professional services").

    - Services that utilize a combination of hardware and software, integrated into a total system (called "turnkey systems").

A.   USER EXPENDITURES

- All user expenditures reported are "available" (i.e., noncaptive, as defined below).

- NONCAPTIVE INFORMATION SERVICES USER EXPENDITURES - Expenditures paid for information services provided by a vendor that is not part of the same parent corporation as the user.

INPUT

- <u>CAPTIVE INFORMATION SERVICES USER EXPENDITURES</u> - Expenditures received from users who are part of the same parent corporation as the vendor.

B.   DELIVERY MODES

- <u>PROCESSING SERVICES</u> - This category includes remote computing services, batch services, processing facilities management, and value-added networks (VANs).

    - <u>REMOTE COMPUTING SERVICES (RCS)</u> - Providing computer processing to a user by means of terminal(s) at the user's site(s) connected by a data communications network to the vendor's central computer. There are four submodes of RCS, including:

        - <u>Interactive</u> - Characterized by the interaction of the user with the system for the purpose of problem-solving, data entry, and/or transaction processing. The user is on-line to the program/files. Computer response is usually measured in seconds or fractions of a second.

        - <u>Remote Batch</u> - A service in which the user hands over control of a job to the vendor's computer, which schedules job execution according to priorities and resource requirements. Computer response is usually measured in minutes or hours.

        - <u>Data Base</u> - Characterized by the retrieval and processing of information from a vendor-provided data base. The data base may be owned by the vendor or a third party.

INP

- • <u>User Site Hardware Services (USHS)</u> - Offerings provided by RCS vendors that place programmable hardware on the user's site (rather than in the vendor's computer center). USHS offers access to a communications network, access through the network to the RCS vendor's larger computers, and significant software as part of the service.

- <u>BATCH SERVICES</u> - This includes computer processing performed at vendors' sites of user programs and/or data that are physically transported (as opposed to electronically by telecommunications media) to and/or from those sites. Data entry and data output services, such as keypunching and computer output microfilm processing, are also included. Batch services include those expenditures by users who take their data to a vendor site that has a terminal connected to a remote computer for the actual processing.

- <u>PROCESSING FACILITIES MANAGEMENT (PFM)</u> (also referred to as "resource management" or "systems management") - The management of all or a major part of a user's data processing functions under a long-term contract (more than one year). This would include both remote computing and batch services. To qualify as PFM, the contractor must directly plan, control, operate, and own the facility provided to the user, either on-site, through communications lines, or in a mixed mode.

- <u>VALUE-ADDED NETWORKS (VANs)</u> - VANs typically involve common carrier network transmission facilities that are augmented with computerized switching. These networks have become associated with packet-switching technology because the public VANs that have received the most attention (e.g., Telenet and TYMNET) employ packet-switching techniques. However, other added data service features such as store-and-forward message switching, terminal interfacing, error detection and correction, and host computer interfacing are of equal importance.

INPUT

–   Processing services are further differentiated as follows:

•   <u>Cross-industry</u> services involve the processing of applications that are targeted to specific user departments (e.g., finance, personnel, sales) but that cut across industry lines. Most general ledger, accounts receivable, payroll, and personnel applications fall into this category. Cross-industry data base services, for which the vendor supplies the data base and controls access to it (although it may be owned by a third party), are included in this category. General-purpose tools such as financial planning systems, linear regression packages, and other statistical routines are also included. However, when the application, tool, or data base is designed for specific industry use, then the service is industry-specific (see below).

•   <u>Industry-specific</u> services provide processing for particular functions or problems unique to an industry or industry group. Specialty applications can be either business or scientific in orientation. Industry-specific data base services, for which the vendor supplies the data base and controls access to it (although it may be owned by a third party), are also included under this category. Examples of industry-specialty applications are seismic data processing, numerically controlled machine tool software development, and demand deposit accounting.

•   <u>Utility</u> services are those for which the vendor provides access to a computer and/or communications network with basic software that enables users to develop and/or process their own systems. These basic tools often include terminal-handling software, sorts, language compilers, data base management systems, information retrieval software, scientific library routines, and other systems software.

INP

- SOFTWARE PRODUCTS - This category includes users' purchases of applications and/or systems software that is sold by vendors as standard products intended for use by different organizations. Included as user expenditures are lease and purchase expenditures as well as fees for work performed by the vendor to implement and maintain the package (when such fees are either bundled as part of the product price or offered on an annual subscription basis). Fees for work related to education, consulting, and/or custom modification of software products are counted as professional services, provided such fees are charged separately from the price of the software product itself. There are several subcategories of software products, including:

    - APPLICATIONS SOFTWARE PRODUCTS - Software that performs a specific function directly related to solving a business or organizational need. Applications software provides information directly for use by the end user. Applications software products classifications are:

        . Cross-Industry Products - Used in multiple user industry sectors. Examples are payroll, inventory control, and financial planning.

        . Industry-Specific Products - Used in a specific industry sector such as banking and finance, transportation, or discrete manufacturing. Examples are demand deposit accounting, airline scheduling, and materials resource planning.

    - SYSTEMS SOFTWARE PRODUCTS - Software that enables the computer/communications system to perform basic functions, which are interim steps to providing the end user with "answers" sought. Systems software product classifications are:

        . Systems Control Products - These products function during applications program execution to manage the computer system

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resource. Examples include operating systems, communication monitors, and emulators.

- <u>Data Center Management Products</u> - These products are used by operations personnel to manage the computer system resources and personnel more effectively. Examples include performance measurement, job accounting, computer operations scheduling, and utilities.

- <u>Application Development Products</u> - These products are used to prepare applications for execution by assisting in design, programming, testing, and related functions. Examples include languages, sorts, productivity aids, data dictionaries, data base management systems, report writers, and retrieval systems.

• <u>PROFESSIONAL SERVICES</u> - This category is made up of modes in the following categories:

- <u>SOFTWARE DEVELOPMENT</u> - This service develops a software system on a custom basis. It includes one or more of the following: user requirements, system design, contract, and programming.

- <u>EDUCATION AND TRAINING SERVICES</u> - These services help people acquire new skills, techniques, or knowledge related to computers. This definition does not include services to educational institutions. (This latter market is included in the education (industry-specific) segment.)

- <u>CONSULTING SERVICES</u> - Consultants advise clients on computer-related issues that are usually management oriented. Feasibility studies and computer audits are examples of services provided.

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-     <u>PROFESSIONAL SERVICES FACILITIES MANAGEMENT (PSFM)</u> - This is counterpart to processing facilities management, except that in this case the computers are owned by the client, not the vendor; the vendor provides human resources to operate and manage the client facility.

- <u>TURNKEY SYSTEMS</u> (also known as Integrated Systems) - A turnkey system is an integration of systems and applications software with CPU hardware and peripherals, packaged as a single applications solution. The value added by the vendor is primarily in the software and support. Most CAD/CAM systems and many small business systems are turnkey systems. This does not include specialized hardware systems such as word processors, cash registers, or process control systems, nor does it include Embedded Computer Resources for military applications. Turnkey systems are available either as custom or packaged systems.

  - Hardware vendors that combine software with their own general purpose hardware are not classified by INPUT as turnkey vendors.

  - Turnkey systems revenue is divided into two categories.

    - <u>Industry-specific</u> systems--that is, systems that serve a specific function for a given industry sector such as automobile dealer parts inventory, CAD/CAM systems, or discrete manufacturing control systems.

    - <u>Cross-industry</u> systems--that is, systems that provide a specific function that is applicable to a wide range of industry sectors such as financial planning systems, payroll systems, or personnel management systems.

  - Revenue includes hardware, software, and support functions.

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- SYSTEMS INTEGRATION - Services associated with systems design, integration of computing components, installation, and acceptance of computer/communication systems. Systems integration can include one or more of the major information services delivery modes--professional services, turnkey systems, and software products. System components may be furnished by separate vendors (not as an integrated system by one vendor, called the prime contractor); services may be furnished by a vendor or by a not-for-profit organization. Integration services may be provided with related engineering activities, such as SE&I (Systems Engineering and Integration) or SETA (Systems Engineering and Technical Assistance).

C.   HARDWARE/HARDWARE SYSTEMS

- HARDWARE - Includes all computer communications equipment that can be separately acquired, with or without installation by the vendor, and not acquired as part of a system.

  - PERIPHERALS - Includes all input, output, communications, and storage devices, other than main memory, that can be locally connected to the main processor and generally cannot be included in other categories, such as terminals.

  - INPUT DEVICES - Includes keyboards, numeric pads, card records, bar-code readers, lightpens and trackballs, tape readers, position and motion sensors, and A-to-D (analog-to-dialog) converters.

  - OUTPUT DEVICES - Includes printers, CRTs, projection television screens, microfilm processors, digital graphics, and plotters.

  - COMMUNICATION DEVICES - Modems, encryption equipment, special interfaces, and error control.

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- STORAGE DEVICES - Includes magnetic tape (reel, cartridge, and cassette), floppy and hard disks, solid state (integrated circuits), and bubble and optical memories.

- TERMINALS - There are three types of terminals:

  - USER PROGRAMMABLE (also called "intelligent terminals"):

    - Single-station or standalone.

    - Multistation-shared processor.

    - Teleprinter.

    - Remote batch.

  - USER NONPROGRAMMABLE:

    - Single-station.

    - Multistation-shared processor.

    - Teleprinter.

  - LIMITED FUNCTION - Originally developed for specific needs, such as POS (point of sale), inventory data collection, controlled access, etc.

- HARDWARE SYSTEMS - Includes all processors, from microcomputers to super (scientific) computers. Hardware systems require type- or model-unique operating software to be functional, but the category excludes applications software and peripheral devices, other than main memory and processor or CPUs not provided as part of an integrated (turnkey) system.

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- <u>MICROCOMPUTER</u> (or personal computer or PC) – Combines all of the CPU, memory, and peripheral functions of an 8- or 16-bit computer on a chip, in the form of:

  . Integrated circuit package.

  . Plug-in board with more memory and peripheral circuits.

  . Console—including keyboard and interfacing connectors.

  . Personal computer with at least one external storage device directly addressable by CPU.

- <u>MINICOMPUTER</u> – Usually a 12-, 16- or 32-bit computer, which may be provided with limited applications software and support, and may represent a portion of a complete large system.

  . Personal business computer.

  . Small laboratory computer.

  . Nodal computer in a distributed data network, remote data collection network, connected to remote microcomputers.

- <u>MAINFRAME</u> – Typically a 32- or 64-bit computer, with extensive applications software and a number of peripherals in standalone or multiple CPU configurations for business (administrative, personnel, and logistics) applications, also called a General-Purpose Computer.

  . Large computer mainframes are presently centered around storage controllers but likely to become bus-oriented and to consist of multiple processors (CPUs) or parallel processors;

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they are intended for structured mathematical and signal processing, and are generally used with general-purpose von-Newmann-type processors for system control.

- Supercomputer mainframes are high-powered processors with numerical processing throughout that is significantly greater than the largest general-purpose computers, with capacities in the 10-50 MFLOPS (million floating point operations per second) range, in two categories:

- REAL TIME - Generally used for signal processing.

- NONREAL TIME - For scientific use, with maximum burst-mode (but sustained speed) capacities of up to 100 MFLOPS, in one of three configurations:

    - Parallel processors.

    - Pipeline processors.

    - Vector processors.

- Newer supercomputers--with burst modes approaching 300 MFLOPS, main storage size up to 10 million words, and on-line storage in the one-to-three gigabyte class--are also becoming more common.

- EMBEDDED COMPUTER - Dedicated computer system designed and implemented as an integral part of a weapon or weapon system, or platform, that is critical to a military or intelligence mission, such as command and control, cryptological activities, or intelligence activities. Characterized by MIL SPEC (military specification) appearance and operation, limited but reprogrammable applications software, and permanent or semipermanent interfaces. May vary in capacity from

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microcomputers to parallel-processor computer systems. Information services forecasts in this report do not include applications for this type of computer.

D.   TELECOMMUNICATIONS

- <u>NETWORKS</u> - Interconnection services between computing resources. Provided on a leased basis by a vendor to move data and/or textual information from one or more locations to one or more locations.

    - <u>COMMON CARRIER NETWORK (CCN)</u> - Provided via conventional voice-grade circuits and through regular switching facilities (dial-up calling) with leased or user-owned modems (to convert digital information to voice-grade tones) for transfer rates between 150 and 1,200 baud.

    - <u>VALUE-ADDED NETWORK (VAN)</u> - (See listing under Section B, Delivery Modes.)

    - <u>LOCAL-AREA NETWORK (LAN)</u> - Restricted limited-access network between computing resources in a relatively small (but not necessarily contiguous) area, such as a building, complex of buildings, or buildings distributed within a metropolitan area. One of the two types:

        - <u>BASEBAND</u> - Voice bandwidth at voice frequencies (same as telephone, teletype system) limited to a single sender at any given moment and limited to speeds of 75 to 1,200 baud, in serial mode.

        - <u>BROADBAND</u> - Employs multiplexing techniques to increase carrier frequency between terminals, to provide:

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- Multiple (simultaneous) channels via FDM (Frequency Division Multiplexing).

- Multiple (time-sequenced) channels via TDM (Time Division Multiplexing).

- High-speed data transfer rate via parallel mode at rates of up to 96,000 baud (or higher, depending on media).

- **TRANSMISSION MEDIA** - Varies with the supplier (vendor) and with the distribution of the network and its access mode to the individual computing resource location.

  - MODE - may be either:

    - ANALOG - Typified by the predominantly voice-grade network of AT&T's DDD (Direct Distance Dialing) and by operating telephone company distribution systems.

    - DIGITAL - Where voice, data, and/or text are digitized into a binary stream.

  - MEDIA varies with distance, availability, and connectivity:

    - WIRE - Varies from earlier single-line teletype networks, to two-wire standard telephone (twisted pair) and balanced line, to four-wire full-duplex balanced lines.

    - CARRIER - Multiplexed signals on two-wire and four-wire networks to increase capacity by FDM.

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- COAXIAL CABLE - HF (High Frequency) and VHF (Very High Frequency), single frequency, or carrier-based system that requires frequent reamplification (repeaters) to carry the signal any distance.

- MICROWAVE - UHF (Ultra High Frequency) multichannel, point-to-point, repeated radio transmission, also capable of wide frequency channels.

- OPTICAL FIBER - Local signal distribution systems employed in limited areas, using light-transmitting glass fibers, and using TDM for multichannel applications.

- SATELLITES - Synchronous earth-orbiting systems that provide point-to-point, two-way service over significant distances without intermediate amplification (repeaters), but requiring suitable groundstation facilities for up- and down-link operation.

- CELLULAR RADIO - Network of fixed, low-powered two-way radios that are linked by a computer system to track mobile phone/data set units; each radio serves a small area called a cell. The computer switches service connection to the mobile unit from cell to cell as the unit moves among the cells.

E.   OTHER CONSIDERATIONS

- When questions arise about the proper place to count certain user expenditures, INPUT addresses them from the user viewpoint. Expenditures are then categorized according to what users perceive they are buying.

- The standard industrial classification (SIC) codes are used to define the economic activity contained in generic sectors such as process manufacturing, insurance, or transportation.

- The specific industries (and their SIC codes) included under these generic industry sectors are detailed in Exhibit A-I.

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INDUSTRY SECTOR DEFINITIONS

INDUSTRY SECTOR	INDUSTRY SIC	INDUSTRY NAME
Discrete Manufacturing	23	Apparel
	25	Furniture
	27	Printing
	31	Leather
	34	Metal
	35	Machinery
	36	Electronics
	37	Transportation
	38	Scientific and Control Instruments
	39	Miscellaneous Manufacturing
Process Manufacturing	10	Metal Mining
	11	Anthracite Mining
	12	Coal Mining
	13	Oil and Gas Extraction
	14	Mining/Quarrying of Non-Metallic Minerals, except Fuels
	20	Food Products
	21	Tobacco
	22	Textile Products
	24	Lumber and Wood Products
	26	Paper Products
	28	Chemicals
	29	Petroleum
	30	Rubber and Plastics
	32	Stone, Glass, Clay
	33	Primary Metals

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INDUSTRY SECTOR DEFINITIONS

INDUSTRY SECTOR	INDUSTRY SIC	INDUSTRY NAME
Transportation	40	Railroads
	41	Local Transit
	42	Motor Freight
	43	U.S. Postal Service
	44	Water Transportation
	45	Air
	46	Pipelines
	47	Transportation Services
Utilities	49	Electric, Gas, and Sanitary
Telecommunications	48	Communications
Wholesale Distribution	50	Durable Goods
	51	Nondurable Goods
Retail Distribution	52	Building Materials, Hardware
	53	General Merchandise
	54	Food
	55	Automotive and Gas Stations
	56	Apparel
	57	Furniture
	58	Eating and Drinking
	59	Miscellaneous Retail

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INDUSTRY SECTOR DEFINITIONS

INDUSTRY SECTOR	INDUSTRY SIC	INDUSTRY NAME
Banking and Finance	60	Banks
	61	Credit Agencies
	62	Security and Commodity Brokers
	67	Holding and Investment Offices
Insurance	63	Insurance (Life, Health, Etc.)
	64	Insurance Agents
Medical	80	Health Services
Education	82	Educational Services
Services	73	Business Services (excluding information services companies themselves)
	89	Miscellaneous Services
Federal Government	N/A	As Appropriate
State and Local Government	N/A	As Appropriate

INDUSTRY SECTOR DEFINITIONS

INDUSTRY SECTOR	INDUSTRY SIC	INDUSTRY NAME
Other Industries	01-09	Agriculture, Forestry, and Fishing
	15-17	Construction
	65	Real Estate
	66	Combinations of Real Estate, Insurance, Loans, Law Offices
	70	Hotels, Rooming Houses, Camps, and Other Lodging Places
	72	Personal Services
	75	Automotive Repair, Services, and Garages
	76	Miscellaneous Repair Services
	78	Motion Pictures
	79	Amusement and Recreation Services, Except Motion Pictures
	81	Legal Services
	83	Social Services
	84	Museums, Art Galleries, Botanical and Zoological Gardens
	86	Membership Organizations

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APPENDIX B: FORECASTS AND RECONCILIATION

APPENDIX B: FORECASTS AND RECONCILIATION

- The overall market slowdown in 1985 impacted INPUT's 1984 forecasts for software products.

    - In 1984, INPUT projected the 1984-1985 growth rate as 33%. This year we have reassessed the industry and lowered our growth rate for the same time period to 20% (see Exhibits B-1 through B-6).

    - INPUT's five-year growth rate forecast has been revised downward from 31% to 25%. Some of the aforementioned slowdown reasons mentioned in Chapter I still apply, and other long-term market growth impediments are included in Exhibit B-7.

- To be noted is that the overall software product market is still expected to have a significant growth rate—25%—considered exceptionally healthy in most major industries.

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EXHIBIT B-1

TOTAL INFORMATION SERVICES MARKET FORECAST
BY DELIVERY MODE, 1985-1990

SEGMENTATION BY DELIVERY MODE	($M) 1984	84-85 GROWTH	($M) 1985	($M) 1986	($M) 1987	($M) 1988	($M) 1989	($M) 1990	AAGR 85-90
REMOTE COMPUTING/BATCH									
INDUSTRY SPECIFIC	6787	15%	7827	9211	10843	12709	14943	17512	17%
CROSS INDUSTRY	4254	14%	4852	5614	6542	7653	8953	10408	16%
UTILITY PROCESSING	1789	6%	1896	2029	2171	2301	2416	2537	6%
SUBTOTAL	12830	14%	14575	16854	19556	22669	26312	30457	16%
FACILITIES MANAGEMENT									
INDUSTRY SPECIFIC	1864	15%	2151	2488	2890	3363	3865	4436	16%
CROSS INDUSTRY	57	5%	60	62	63	64	67	71	3%
UTILITY PROCESSING	142	10%	156	181	211	242	281	332	16%
SUBTOTAL	2063	15%	2367	2731	3164	3669	4213	4839	15%
TOTAL PROCESSING/NETWORK SERV.									
INDUSTRY SPECIFIC	8651	15%	9978	11699	13733	16072	18808	21948	17%
CROSS INDUSTRY	4311	14%	4912	5676	6605	7723	9020	10479	16%
UTILITY PROCESSING	1931	6%	2052	2210	2382	2543	2697	2869	7%
VANS	290	27%	368	467	595	762	982	1270	28%
TOTAL	15183	14%	17310	20052	23315	27100	31507	36566	16%
SOFTWARE PRODUCTS									
MAINFRAME/MINICOMPUTER									
INDUSTRY SPECIFIC	2248	22%	2751	3637	4810	6123	7820	9750	29%
CROSS INDUSTRY	1948	17%	2275	2808	3414	3994	4518	5087	17%
SUBTOTAL	4196	19%	5026	6445	8224	10117	12338	14837	23%
MICROCOMPUTER									
INDUSTRY SPECIFIC	352	34%	473	702	1049	1530	2125	3034	45%
CROSS INDUSTRY	1193	23%	1465	1868	2340	2786	3217	3679	20%
SUBTOTAL	1545	23%	1938	2570	3389	4316	5342	6713	32%
TOTAL APPLICATIONS SOFTWARE	5741	21%	6964	9015	11613	14433	17680	21550	25%
SYSTEMS SOFTWARE									
MAINFRAME/MINICOMPUTER	4685	19%	5569	7034	8985	11124	13284	15540	23%
MICROCOMPUTER	648	16%	753	979	1392	2034	2923	4111	40%
TOTAL SYSTEMS SOFTWARE	5333	19%	6322	8013	10377	13158	16207	19651	25%
TOTAL SOFTWARE	11074	20%	13286	17028	21990	27591	33887	41201	25%
PROFESSIONAL SERVICES									
SOFTWARE DEVELOPMENT	5307	17%	6233	7327	8723	10546	12817	15253	20%
CONSULTING	1425	20%	1717	2089	2542	3055	3676	4351	20%
EDUCATION	834	26%	1049	1329	1708	2173	2691	3352	26%
FACILITIES MANAGEMENT	660	11%	730	814	905	1000	1096	1197	10%
SYSTEMS INTEGRATION-FED	630	27%	800	984	1220	1489	1801	2162	22%
TOTAL PROFESSIONAL SERVICES	8856	19%	10529	12543	15098	18263	22081	26315	20%
TURNKEY SYSTEMS									
INDUSTRY SPECIFIC	4325	17%	5070	6017	7207	8724	10490	12646	20%
CROSS INDUSTRY	2055	13%	2327	2653	3063	3539	4135	4721	15%
TOTAL TURNKEY SYSTEMS	6380	16%	7397	8670	10270	12263	14625	17367	19%
GRAND TOTAL	41493	17%	48522	58293	70673	85217	102100	121449	20%

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TOTAL INFORMATION SERVICES USER EXPENDITURE FORECAST
BY MARKET SECTOR, 1985-1990

SEGMENTATION	($M) 1984	84-85 GROWTH	($M) 1985	($M) 1986	($M) 1987	($M) 1988	($M) 1989	($M) 1990	AAGR 85-90
INDUSTRY-SPECIFIC SECTORS *									
DISCRETE MANUFACTURING	2573	17%	3023	3666	4458	5439	6682	7864	21%
PROCESS MANUFACTURING	1131	16%	1311	1571	1880	2265	2730	3215	20%
TRANSPORTATION	401	17%	471	581	736	937	1210	1576	27%
UTILITIES	190	11%	211	240	279	322	372	434	16%
TELECOMMUNICATIONS	508	19%	604	732	886	1068	1285	1545	21%
DISTRIBUTION	1358	16%	1579	1905	2323	2875	3551	4355	22%
BANKING AND FINANCE	4126	19%	4892	5942	7240	8612	10275	12422	20%
INSURANCE	952	13%	1073	1257	1499	1785	2090	2445	18%
MEDICAL	1456	20%	1740	2129	2603	3202	3959	4931	23%
EDUCATION	191	16%	221	264	315	375	448	534	19%
SERVICES	1126	18%	1324	1626	1996	2447	2984	3672	23%
FEDERAL GOVERNMENT	565	20%	678	794	963	1151	1367	1647	19%
STATE AND LOCAL GOVERNMENT	412	16%	478	560	662	792	943	1130	19%
OTHER INDUSTRY-SPECIFIC	587	14%	669	788	959	1119	1347	1608	19%
SUB-TOTAL	15576	17%	18272	22055	26799	32449	39243	47378	21%
PROF. SERVICES TO INDUSTRY	8856	19%	10529	12543	15098	18263	22081	26315	20%
TOTAL INDUSTRY EXPENDITURE	24432	18%	28801	34598	41897	50712	61324	73693	21%
CROSS-INDUSTRY SECTORS **									
PLANNING AND ANALYSIS	1980	19%	2360	2872	3430	3997	4573	5118	17%
ACCOUNTING	2248	15%	2588	3053	3602	4154	4688	5253	15%
HUMAN RESOURCES	1383	13%	1561	1768	2021	2285	2573	2887	13%
ENGINEERING/SCIENTIFIC	1178	17%	1377	1640	1975	2368	2809	3327	19%
EDUCATION/TRAINING	242	21%	294	363	458	578	715	904	25%
ON-LINE DATA BASES	607	19%	722	896	1120	1399	1734	2152	24%
OTHER CROSS-INDUSTRY	1869	11%	2077	2413	2816	3261	3798	4325	16%
SUB-TOTAL	9507	15%	10979	13005	15422	18042	20890	23966	17%
OTHER SECTORS									
UTILITY PROCESSING	1931	6%	2052	2210	2382	2543	2697	2869	7%
SYSTEMS SOFTWARE	5333	19%	6322	8013	10377	13158	16207	19651	25%
VANS	290	27%	368	467	595	762	982	1270	28%
GRAND TOTAL	41493	17%	48522	58293	70673	85217	102100	121449	20%

* Professional Services expenditures are included in the industry-specific category.
The industry-specific detail forecast show these as seperate line items.

** Cross-industry Processing Facilities Management user expenditures are not broken down by application
and are included in the 'other cross-industry' segment.

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TOTAL SOFTWARE PRODUCTS USER EXPENDITURE FORECAST
BY MARKET SEGMENT, 1985-1990

	($M) 1984	84-85 GROWTH	($M) 1985	($M) 1986	($M) 1987	($M) 1988	($M) 1989	($M) 1990	85-90 AAGR
APPLICATIONS SOFTWARE									
INDUSTRY-SPECIFIC SEGMENTS									
DISCRETE MANUFACTURING	624	15%	717	897	1141	1451	1822	2120	24%
PROCESS MANUFACTURING	124	29%	160	228	324	451	620	852	40%
TRANSPORTATION	102	29%	132	187	269	380	537	763	42%
UTILITIES	23	13%	26	33	44	56	70	91	28%
TELECOMMUNICATIONS	35	34%	47	70	100	139	190	260	41%
DISTRIBUTION	272	24%	337	458	622	840	1099	1440	34%
BANKING AND FINANCE	750	25%	939	1268	1715	2117	2700	3466	30%
INSURANCE	241	19%	286	370	489	625	761	912	26%
MEDICAL	204	45%	296	438	625	897	1262	1757	43%
EDUCATION	47	23%	58	78	102	131	165	205	29%
SERVICES	84	31%	110	156	219	297	386	504	36%
FEDERAL GOVERNMENT	17	18%	20	25	32	39	47	55	22%
STATE AND LOCAL GOVERNMENT	24	17%	28	36	46	57	69	84	25%
OTHER INDUSTRY-SPECIFIC	53	28%	68	95	131	173	217	275	32%
SUB-TOTAL	2600	24%	3224	4339	5859	7653	9945	12784	32%
CROSS-INDUSTRY SEGMENTS									
PLANNING AND ANALYSIS	1045	23%	1289	1634	1991	2296	2599	2890	18%
ACCOUNTING	1001	18%	1179	1473	1813	2124	2368	2605	17%
HUMAN RESOURCES	397	13%	450	534	625	706	780	875	14%
ENGINEERING/SCIENTIFIC	153	19%	182	234	300	379	459	561	25%
EDUCATION/TRAINING	60	40%	84	125	186	269	376	521	44%
OTHER CROSS-INDUSTRY	485	15%	556	676	839	1006	1153	1314	19%
SUB-TOTAL	3141	19%	3740	4676	5754	6780	7735	8766	19%
TOTAL APPLICATIONS SOFTWARE	5741	21%	6964	9015	11613	14433	17680	21550	25%
SYSTEMS SOFTWARE									
APPLICATION DEVELOPMENT	2272	23%	2785	3654	4909	6412	8160	10311	30%
SYSTEMS CONTROL	1837	16%	2137	2662	3391	4256	5187	6102	23%
DATA CENTER MANAGEMENT	1224	14%	1400	1697	2077	2490	2860	3238	18%
TOTAL SYSTEMS SOFTWARE	5333	19%	6322	8013	10377	13158	16207	19651	25%
GRAND TOTAL	11074	20%	13286	17028	21990	27591	33887	41201	25%

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MINI/MAINFRAME TOTAL SOFTWARE USER EXPENDITURE FORECAST BY MARKET SEGMENT, 1985-1990

	($M) 1984	84-85 GROWTH	($M) 1985	($M) 1986	($M) 1987	($M) 1988	($M) 1989	($M) 1990	85-90 AAGR
INDUSTRY-SPECIFIC SEGMENTS									
DISCRETE MANUFACTURING	586	13%	661	806	984	1210	1491	1644	20%
PROCESS MANUFACTURING	96	27%	122	170	236	322	432	577	36%
TRANSPORTATION	87	28%	111	156	222	309	432	608	41%
UTILITIES	20	10%	22	27	34	42	49	59	22%
TELECOMMUNICATIONS	30	33%	40	59	84	114	154	208	39%
DISTRIBUTION	215	22%	262	348	461	601	777	999	31%
BANKING AND FINANCE	674	25%	845	1140	1539	1883	2379	2989	29%
INSURANCE	195	17%	228	288	374	465	550	630	23%
MEDICAL	174	45%	252	366	512	717	997	1365	40%
EDUCATION	15	13%	17	22	27	33	39	44	21%
SERVICES	69	25%	86	115	153	195	238	287	27%
FEDERAL GOVERNMENT	14	14%	16	20	25	30	36	41	21%
STATE AND LOCAL GOVERNMENT	23	13%	26	33	41	49	56	64	20%
OTHER INDUSTRY-SPECIFIC	50	26%	63	87	118	153	190	235	30%
SUB-TOTAL	2248	22%	2751	3637	4810	6123	7820	9750	29%
CROSS-INDUSTRY SEGMENTS									
PLANNING AND ANALYSIS	481	25%	603	787	992	1196	1401	1596	21%
ACCOUNTING	806	13%	912	1098	1307	1489	1631	1785	14%
HUMAN RESOURCES	362	13%	410	485	563	630	690	768	13%
ENGINEERING/SCIENTIFIC	127	18%	150	191	242	302	361	436	24%
EDUCATION/TRAINING	22	36%	30	43	61	83	108	138	36%
OTHER CROSS-INDUSTRY	150	13%	170	204	249	294	327	364	16%
SUB-TOTAL	1948	17%	2275	2808	3414	3994	4518	5087	17%
TOTAL APPLICATIONS SOFTWARE	4196	20%	5026	6445	8224	10117	12338	14837	24%
SYSTEMS SOFTWARE									
APPLICATION DEV TOOLS	1944	23%	2383	3108	4112	5263	6496	7917	27%
SYSTEMS CONTROL	1527	18%	1800	2252	2836	3440	4055	4613	21%
DATA CENTER MANAGEMNET	1214	14%	1386	1674	2037	2421	2733	3010	17%
SUB-TOTAL	4685	19%	5569	7034	8985	11124	13284	15540	23%
GRAND TOTAL	8881	19%	10595	13479	17209	21241	25622	30377	23%

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EXHIBIT B-5

MICROCOMPUTER TOTAL SOFTWARE FORECAST
BY MARKET SEGMENT, 1985-1990

	($M) 1984	84-85 GROWTH	($M) 1985	($M) 1986	($M) 1987	($M) 1988	($M) 1989	($M) 1990	85-90 AAGR
INDUSTRY-SPECIFIC SEGMENTS									
DISCRETE MANUFACTURING	38	47%	56	91	157	241	331	476	53%
PROCESS MANUFACTURING	28	36%	38	58	88	129	188	275	49%
TRANSPORTATION	15	40%	21	31	47	71	105	155	49%
UTILITIES	3	33%	4	6	10	14	21	32	52%
TELECOMMUNICATIONS	5	40%	7	11	16	25	36	52	49%
DISTRIBUTION	57	32%	75	110	161	239	322	441	43%
BANKING AND FINANCE	76	24%	94	128	176	234	321	477	38%
INSURANCE	46	26%	58	82	115	160	211	282	37%
MEDICAL	30	47%	44	72	113	180	265	392	55%
EDUCATION	32	28%	41	56	75	98	126	161	31%
SERVICES	15	60%	24	41	66	102	148	217	55%
FEDERAL GOVERNMENT	3	33%	4	5	7	9	11	14	28%
STATE AND LOCAL GOVERNMENT	1	100%	2	3	5	8	13	20	58%
OTHER INDUSTRY-SPECIFIC	3	67%	5	8	13	20	27	40	52%
SUB-TOTAL	352	34%	473	702	1049	1530	2125	3034	45%
CROSS-INDUSTRY SEGMENTS									
PLANNING AND ANALYSIS	564	22%	686	847	999	1100	1198	1294	14%
ACCOUNTING	195	37%	267	375	506	635	737	820	25%
HUMAN RESOURCES	35	14%	40	49	62	76	90	107	22%
ENGINEERING/SCIENTIFIC	26	23%	32	43	58	77	98	125	31%
EDUCATION/TRAINING	38	42%	54	82	125	186	268	383	48%
OTHER CROSS-INDUSTRY	335	15%	386	472	590	712	826	950	20%
SUB-TOTAL	1193	23%	1465	1868	2340	2786	3217	3679	20%
TOTAL APPLICATIONS SOFTWARE	1545	25%	1938	2570	3389	4316	5342	6713	28%
SYSTEMS SOFTWARE									
APPLICATION DEV TOOLS	328	23%	402	546	797	1149	1664	2394	43%
SYSTEMS CONTROL	310	9%	337	410	555	816	1132	1489	35%
DATA CENTER MANAGEMENT	10	40%	14	23	40	69	127	228	75%
SUB-TOTAL	648	16%	753	979	1392	2034	2923	4111	40%
GRAND TOTAL	2193	23%	2691	3549	4781	6350	8265	10824	32%

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SYSTEMS SOFTWARE USER EXPENDITURE FORECAST
BY DELIVERY MODE, 1985-1990

DELIVERY MODE	($M) 1984	84-85 GROWTH	($M) 1985	($M) 1986	($M) 1987	($M) 1988	($M) 1989	($M) 1990	85-90 AACR
APPLICATION DEVELOPMENT TOOLS									
MAINFRAME/MINI	1944	23%	2383	3108	4112	5263	6496	7917	27%
MICRO	328	23%	402	546	797	1149	1664	2394	43%
TOTAL APPLICATION DEVELOPMEN	2272	23%	2785	3654	4909	6412	8160	10311	30%
SYSTEMS CONTROL									
MAINFRAME/MINI	1527	18%	1800	2252	2836	3440	4055	4613	21%
MICRO	310	9%	337	410	555	816	1132	1489	35%
TOTAL SYSTEMS CONTROL	1837	16%	2137	2662	3391	4256	5187	6102	23%
DATA CENTER MANAGEMENT									
MAINFRAME/MINI	1214	14%	1386	1674	2037	2421	2733	3010	17%
MICRO	10	40%	14	23	40	69	127	228	75%
TOTAL DATA CENTER MANAGEMENT	1224	14%	1400	1697	2077	2490	2860	3238	18%
TOTAL MAINFRAME/MINI	4685	19%	5569	7034	8985	11124	13284	15540	23%
TOTAL MICROCOMPUTER	648	16%	753	979	1392	2034	2923	4111	40%
GRAND TOTAL	5333	19%	6322	8013	10377	13158	16207	19651	25%

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EXHIBIT B-7

CHANGES FROM 1984 SOFTWARE PRODUCTS

REASONS

1. Sheer Size of Market in 1989/1990

2. Acceleration of Drive to Recurring Revenue --
   Selling More Leases Than One Time Purchases

3. Implementation Bottleneck

4. Reduced Inflation

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APPENDIX C: RELATED INPUT REPORTS

APPENDIX C: RELATED INPUT REPORTS

ANNUAL MARKET ANALYSES

- U.S. Information Services Vertical Markets, 1985-1990
- U.S. Information Services Cross-Industry Markets, 1985-1990
- U.S. Professional Services Markets, 1985-1990
- U.S. Processing Services Markets, 1985-1990
- U.S. Turnkey Markets, 1985-1990

INDUSTRY SURVEYS

- Eighteenth Annual Survey of the Computer Services Industry - 1985

1985 MAPS REPORTS

- Acquisition Strategies for Information Services Firms

SOFTWARE MARKETS

- Fourth Generation Languages Markets
- Computer Integrated Manufacturing Markets
- Applications Software Development Tools
- Data Base Management Systems Markets
- Information Services in A.I., 1985-1990
- Micro-Mainframe: Market Analysis

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- Selling Micro Software to Corporate America
- New Opportunities in Integrated Software
- Analysis of Corporate User Needs
- Microcomputer Software Dealer Survey
- Microcomputer Operating System Directions
- Multi-user Microcomputers

OTHER 1985 REPORTS

- Annual Information Systems Planning Report, 1985

CORPORATE SYSTEMS PLANNING (CSP Program)

- User Service Requirements - TPM
- User Service Requirements - Large Systems
- User Service Requirements - Small Systems
- User Service Requirements - Office Products

INFORMATION SYSTEMS PLANNING (ISP Program)

End User

- Integrated Office Systems
- Multiuser Systems
- Destiny of the Information Center
- Micro-Mainframe End-User Experiences
- Training: Pre Requisite to End-User Computing
- Office Videotex
- Intelligent Workstations

Software

- Micro-Mainframe Software
- Simulation and Prototyping

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- Fourth Generation Language Tools
- Artificial Intelligence
- Applications Software Development Tools
- Data Base Management Systems
- Decision Support Evolution: Data to Knowledge

Telecommunications

- Integrating Voice/Data Communications
- Telecommunicatins Security
- Micro-Mainframe Connectivity
- LAN/CBX Update
- Network Management Systems
- Telecommunications Support Strategies
- Economics of Telecommunications

Corporate Systems

- Information Systems Planning
- Micro-Mainframe: Corporate Impact
- Changing Dynamics of IS Organizations
- Large-Scale Systems Directions: Residual Value-Peripheral
- Large-Scale Systems Directions: Residual Value-Update
- Large-Scale Systems Directions: Residual Value-Mainframe
- Distributed Data Processing

OTHER INPUT SUBSCRIPTION PROGRAMS

- Company Analysis and Monitoring Program (CAMP) for the Information Services Industry
- Customer Service Programs (CSP)
- Information Systems Planning (ISP)
- Federal Information Systems and Services Program (FISSP)

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APPENDIX D: INPUT'S TOP 50 U.S. INDEPENDENT
SOFTWARE PRODUCTS VENDORS

APPENDIX D: INPUT'S TOP 50 U.S. INDEPENDENT SOFTWARE PRODUCTS VENDORS

A. RANKING

	1984 Revenues ($000)
CULLINET SOFTWARE 400 Blue Hill Drive Westwood, MA 02090 (617) 329-7700	$ 144,000
LOTUS DEVELOPMENT CORPORATION 55 Cambridge Parkway Cambridge, MA 02142 (617) 577-8500	$ 140,000
MICROSOFT 10700 Northup Way Bellevue, WA 98004 (206) 828-8080	$ 123,000
MANAGEMENT SCIENCE AMERICA 3445 Peachtree Road, N.E. Atlanta, GA 30326 (404) 239-2000	$ 120,000
ADR Route 206 & Orchard Road CN-8 Princeton, NJ 08540 (201) 874-9000	$ 90,000

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COMPUTER ASSOCIATES INTERNATIONAL $ 81,000
125 Jericho Turnpike
Jericho, NY 11753
(516) 333-6700

INFORMATICS GENERAL $ 74,000
21031 Ventura Blvd.
Woodland Hills, CA 91364
(818) 887-9040

DUN & BRADSTREET $ 70,000
187 Danbury Road
Wilton, CT 06897
(203) 762-2511

UCCEL CORPORATION $ 68,000
UCCEL Tower, Exchange Park
6303 Forest Park Drive
Dallas, TX 75235-5499
(214) 353-7100

ASHTON-TATE $ 64,000
10150 West Jefferson Blvd.
Culver City, CA 90230
(213) 204-5570

CINCOM SYSTEMS $ 53,000
2300 Montana Avenue
Cincinnati, OH 45211
(513) 662-2300

PANSOPHIC SYSTEMS $ 45,000
709 Enterprise Drive
Oak Brook, IL 60521
(312) 986-6032

SAS INSTITUTE, INC. $ 45,000
SAS Circle, Box 8000
Cary, NC 27511-8000
(919) 467-8000

CANDLE CORPORATION $ 40,000
10880 Wilshire Blvd.
24th Floor, Suite 2400
Los Angeles, CA 90024
(213) 470-2277

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INFORMATION BUILDERS $ 38,000
1250 Broadway
New York, NY 10001
(212) 736-4433

GEISCO $ 37,000
401 N. Washinton Street
Rockville, MD 20850
(301) 340-4000

MICROPRO $ 37,000
33 San Pablo Avenue
San Rafael, CA 94903
(415) 499-1200

SOFTWARE AG $ 36,000
11800 Sunrise Valley Drive
Reston, VA 22091
(703) 860-5050

DIGITAL RESEARCH $ 32,000
60 Garden Court
Box DRI
Monterey, CA 93942
(408) 649-3896

MARTIN MARIETTA DATA SYSTEMS $ 31,000
6303 Ivy Lane
Greenbelt, MD 20770
(301) 982-6500

COMPUTER CORPORATION OF AMERICA $ 30,000
4 Cambridge Center
Cambridge, MA 02142
(617) 492-8860

INTEGRATED SOFTWARE SYSTEMS $ 29,000
10505 Sorrento Valley Road
San Diego, CA 92121
(619) 452-0170

McDONNELL DOUGLAS $ 29,000
P.O. Box 516
St. Louis, MO 63166
(314) 232-0232

CONTINENTAL TELECOM $ 28,000
245 Perimeter Center Parkway
Atlanta, GA 30346
(404) 391-8000

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KIRCHMAN CORPORATION $ 28,000
711 Semoran Blvd.
Altamonte Springs, FL 32701
(305) 831-3001

POLICY MANAGEMENT SYSTEMS $ 27,000
P.O. Box 10
Columbia, SC 29202
(803) 735-4000

ADVANCED SYSTEMS APPLICATIONS $ 26,000
P.O. Box 385, One ASA Plaza
Bloomingdale, IL 60108
(312) 893-9055

AMERICAN SOFTWARE, INC. $ 26,000
443 East Paces Ferry Road, N.E.
Atlanta, GA 30305
(404) 261-4381

HOGAN SYSTEMS, INC. $ 24,000
5080 Spectrum Drive
Suite 400E
Dallas, TX 75248
(214) 386-0020

SOFTWARE PUBLISHING CORPORATION $ 23,000
1901 Landings Drive
Mountain View, CA 94043
(415) 962-8910

INFORMATION SCIENCE, INC. $ 23,000
45 Chestnut Ridge Road
Montvale, NJ 07645
(201) 391-1600

MANAGEMENT DECISION SYSTEMS $ 22,000
200 Fifth Avenue
Waltham, MA 02254
(617) 890-1100

MULTIMATE INTERNATIONAL CORPORATION $ 20,000
52 Oakland Avenue North
East Hartford, CT 06108
(203) 522-2116
(800) 842-8676

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CGA COMPUTER INC. $ 19,000
960 Holmdel Road
Holmdel, NJ 07733
(201) 946-8900

WALKER INTERACTIVE PRODUCTS $ 19,000
100 Mission Street
San Francisco, CA 94105
(415) 495-8811

STERLING SOFTWARE, INC. $ 17,000
370 Campbell Center
Dallas, TX 75206
(214) 891-8600

APPLIED COMMUNICATIONS, INC. $ 18,000
300 108th Avenue South
Omaha, NE 68154
(402) 390-7600

SYNCSORT $ 18,000
560 Sylvan Avenue
Englewood Cliffs, NJ 07632
(201) 568-9700

AGS COMPUTERS, INC. $ 18,000
1139 Spruce Drive
Mountainside, NJ 07092
(201) 654-4321

BOOLE & BABBAGE $ 17,000
510 Oakmead Parkway
Sunnyvale, CA 94086
(408) 735-9550

COMPUWARE CORPORATION $ 17,000
30150 Telegraph Road
Birmingham, MI 48010
(313) 540-0400

NCA CORPORATION $ 17,000
3250 Jay Street
Santa Clara, CA 95050
(408) 986-1800

PROJECT SOFTWARE DEVELOPMENT, INC. $ 17,000
14 Story Street
Cambridge, MA 02138
(617) 661-1444

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COGNOS $ 16,000
272 Slater Street, 10th Floor
Ottawa, Ontario KIP5H9
(613) 237-1440

ON-LINE SOFTWARE $ 16,000
Fort Lee Executive Park
2 Executive Drive
Fort Lee, NJ 07024
(201) 592-0009

MORINO ASSOCIATES $ 15,000
8615 Westwood Center Drive
Vienna, VA 22180
(703) 734-9494

COMSERV CORPORATION $ 15,000
3400 Conserv Drive
Eagan, MN 55122
(612) 681-7000

CITICORP INFORMATION RESEARCH $ 15,000
1600 Summer Street
Stamford, CT 06905
(203) 964-8500

SCIENCE MANAGEMENT CORPORATION $ 15,000
P.O. Box 600
Basking Ridge, NJ 07920
(201) 647-7000

MEDITECH $ 15,000
255 "B" Street
Cambridge, MA 02141
(617) 354-3000

B.   MARKET ANALYSIS

- The Top 50 Independent Software Product Vendors continue to reflect a dynamic and growing marketplace.

- The data for this year's Top 50 was compiled from an analysis of the Information Services industry that was conducted by INPUT this spring.

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- The revenue estimates are for calendar year 1984 and reflect the U.S. software product revenue of the largest indendent software products vendors; i.e., vendors that do not sell hardware as their main source of revenue. Software revenues are included in this list even if they do not comprise the majority of a firm's information services revenue. Thus, for example, the majority of McDonnell Douglas' Information Systems Group's U.S. revenue is processing services. However, their total software products revenue is sufficiently large to enable them to be listed in the Top 50. The figures include software maintenance for standard software packages, but do not include development of custom software, education, training, or consulting. Captive sales of software products (that is, sales to internal groups of affiliated companies) are excluded from these listings.

- The Top 50 ranking is based on the performance of vendors in the business environment. This means that like last year, sales of entertainment and education products are not counted. Also excluded are software distributors like Softsel and Micro D.

- To add a further perspective, INPUT estimates that total outside U.S. software products expenditures by businesses was $10.4 billion in 1984. Of that, over $3 billion went to hardware vendors for systems and applications software. Additional amounts went to timesharing companies, turnkey systems vendors, and custom software developers.

- The Top 50 are a major factor in this complex market, and they generated nearly 23% or $2.4 billion of the total 1984 domestic user expenditures. Cullinet ranked first with $144 million, up from number two last year with $92 million. Lotus Development Corporation ranked second, with $140 million, moving up from a number 6 last year at $53 million. Last year only Management Science America, Inc. (MSA) was over the $100 million mark. This year, four companies exceeded the century mark (Cullinet, Lotus, MSA, and Microsoft), and as a group they accounted for 33% of the Top 50 total.

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- Also increasing was the number of companies between $50 and $100 million. This group generated 23% of the total as their number increased from six to seven.

- A number of major trends are shaping the character of today's software products marketplace. They include:

    - Increasing integration of applications and systems software into a single product offering. The most successful products of the last half of the decade will have almost as much value added from systems software components as they will have from their application software parts. For example, the full value of a general ledger system will be as much due to integrated systems software components such as DBMS, micro mainframe links, and fourth generation languages as it will be to the basic accounting functions it performs.

    - Emergence of a true distributed data processing (DDP) environment. This new, more complex universe with its multi-layered processing and remote data base locations is accelerating the obsolescence of older software products. This is bad news for vendors with out-of-date product offerings and/or limited resources, but is good news for vendors prepared to invest in the definition, development, and marketing of new generation DDP-oriented products.

    - The more active and visible presence of IBM in terms of pricing, development, and joint marketing of software products for all sizes of computers.

    - Entry into the software products arena of non-software product information services vendors (e.g., Martin Marietta Data Systems). These firms are expanding beyond their traditional processing, turnkey, and/or professional services focus to include software products as an important aspect of their total offerings. This strengthens their appeal to the specialized markets that these vendors intend to serve.

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- Significant acquisition activity. No less than seven of last year's Top 50 vendors are now part of a larger organization.

- All of the factors mentioned above are helping to create a 1985 software proucts marketplace that is unusually fast changing and increasingly resource intensive. Fortunately, there exists innumerable opportunities provided vendors are willing to be not only innovative but also continuously aggressive in making major investments in quality management, marketing, and technical personnel.

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